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An Analysis of Pre-Service Science Teachers' Moral Considerations About Environment and Their Attitudes towards Sustainable Environment

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Abstract

This study aims at analysing the moral considerations of pre-service science teachers about environment and their attitudes towards sustainable environment. It was carried out during the school year of 2014-2015 with 1438 pre-service science teachers attending public universities in the Aegean region of Turkey. The data of the study were collected using two tools: "the scale of ecocentric, anthropocentric and hostile attitudes towards environment" and "Sustainable Environmental Attitude Scale". The data collected were analysed using descriptive statistics. In addition, in order to determine the correlation between participants' scores in the scale of ecocentric, antropocentric and hostile attitudes towards environment and their scores in the sustainable environmental attitude scale the Sperman Brown rank order correlation analysis was employed. The findings showed that the participants had a ecocentric attitude and their attitudes towards sustainable environment was high. It was also found that when the scores of the participants in the scale of ecocentric, antropocentric and hostile attitudes towards environment increased, their scores in the sustainable environmental attitude scale increased. However, when their scores in the hostile attitude dimension increased, their scores in in the sustainable environmental attitude scale decreased. Based on the findings obtained several suggestions were developed in regard to future studies.

Keywords: Sustainable environmental, Environmental ethic, Environmental education

Introduction

Environmental pollution and ecological problems have become common in recent times and therefore, are one of the mostly discussed topics globally. It shows that environmental problems are very serious and global (Kocataş, 1999; Baykal and Baykal, 2008; Erten and Aydoğdu, 2011). Ecological balance has been damaged due to complex production and consumption cycle and this cycle is supported by the paradigms of the dominant world view. Such paradigms also affect people's attitudes, acts and activities, making them a significant part in environmental degeneration (Karaca, 2008).

In environment living beings and inanimates form a whole. Under this framework the relationships between has a clear balance. Environment can tolerate some negative

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events occured in this balance until a certain point to maintain itself (Yıldız, 2011). However, human beings prefered to accept different values in his relationship with environment and began to exploit it. Eventually, this exploitation led to environmental problems. The first stage of human and environmental relationships occurred in the form of the recognition by human beings about environment in an effort to adapt to it. This period continued until the period of hunting and gathering. Beginning by the use of iron-made tools and other equipment human beings began to have control over environment. It continued until industralization and can be called the struggle of human beings against environment (Ertan, 2004). The third period began with industralization and had negative effects on balance in the relationship between human beings and environment. The passion to dominate the environment became a passion to exploit it in this period (Çüçen, 2011). The underlying assumption under this change was that of Bacon, Descartes and Newton which argues "the nature is given people to live in prosperity and people have the right to consume it without any limitation". This paradigma is the strating point for environmental problems and made it possible to use environment without taking into consideration its limits (Karakoç, 2004). Mankind's destroying nature at dangerous levels influenced the future of the planet and all living beings (Parlak, 2004). Environmental problems make it impossible for increasing number of living beings to survive. This fast extinction process is also very serious threatening situation for people who cannot survive without any connection with the nature. Therefore, in order to eliminate or at least, reduce environmental problems various technological and scientific steps have been taken.

The environmental protection activites developed in this process were mostly economy-based and tried to maintain development at desired levels. Such activities were regarded as insufficient and environment-oriented were supported for. This approach change led to emergence of the concept of sustainable development. The work "sustainable" was derived from latin word "sustinere" and was first employed in the Brundtland report in 1987, which was used in the phrase, sustainable development (Çamur and Vaizoğlu, 2007). Sustainable development is development that meets the needs of people without compromising the ability of future generations to meet their own needs and without damaging the balance between economy and ecosystem (Conca and Geoffrey, 2004). Sustainable development had three major components: economic, social and ecological. The economic component requires that the individual and social needs should be efficiently and effectively met and consumption habits should be changed in an environmental friendly manner. The social dimension emphasizes the fact that there should be a fair sharing and social solidarity at the national and international levels. The ecological dimension requires that the natural life should be guaranteed, the consumption of resources should be checked and the consumption of renewable resources should be prefered and the absorptive capacity of nature should be respected (Ergün and Çobanoğlu, 2012).

Given that development does not only refer to economic growth and should include such topics as nutrition, shelter, health-care and educational services, human rights, the concept of sustainable development which is totally defined in economic terms is not enough for solving and eliminating environmental problems. Therefore, trying to solve environmental problems without changing beliefs is just dealing with outcomes without dealing with reasons (Ünder, 1996).

Efforts to avoid environmental degration just achieve the conscious use of the environmental by individuals and institutions and the emergence of the

environmentalists attitude. The significance and basis of environmentalism are not taken into consideration. On the other hand, it makes it difficult to recognize the ethical values and understanding underlying the attitude towards environment which has become environmental exploitation (Özdemir, 2012). Revealing the basis and ethical understanding of environmentalism may help to correctly understand it and to have stronger environmental steps to protect it (Özdemir, 2012). The solutions for environmental problems are closely related to the perceptions of people. In turn, the ethics concept guides the perceptions of people and is very significant in the solution of environmental problems as well as in environmental awareness and sensivity (Karaca, 2008). People's perspective about environment varies based on their understanding of where they are ethically (Çobanoğlu et. al., 2012). Although the environmental ethics has been classified in many ways (Eckersley, R., 1992; Merchant, C., 1992; Naess, A., 1973; O'riodan T., 1977; Young, S., 1986), all these groupings are based on two opposite world views. One of these world views is mechanistic one based on utilitarianism and the instrumental side of the nature. The other one is ecological world view which attributes an internatl value to the nature. The anthropocentric approach is part of the mechanistic world view and focuses on human beings. According to this approach people are the most valuable species and others are only significant when they are beneficial for people (Karahan, 2009). In addition, this approach argues that other things than people have only instrumental value (Callicot, 1984). Ecological world views are based on the assumption that human-oriented approach leads to environmental problems and that instead, an enviromental-oriented approach should be followed. The enviroment-oriented approach argues that people are just part of ecosystem like other living beings (Karakoç, 2004). It further claims that excluding abiotic environmental elements leads to deficiency in terms of environmental wholeness. Instead, the enviroment-oriented approach covers all environmental elements, producing much more comprehensive ethical approach (Kayaer, 2013).

Various attempts to solve environmental problems, which are based on legal frameworks or are technology-oriented cannot manage to achieve the goal. In order to eliminate the factors leading to environmental problems the problems should be eliminated before they are experienced (Şimşekli, 2004). Compromising with environment may provide an opportunity to solve environmental problems before they emerge. On the other hand, such compromise requires the change of behaviour patterns (Karakoç, 2004). Environmental education makes it possible to understand the character of the environmental problems, to develop solutions, and to modify individuals' acts about environment. It is well-known that informed and sensitive individuals much more actively take part in solving environmental problems (Özdemir and Yapıcı, 2010).

In this respect teachers have significant roles to play in making ecological awareness much widespread, in acquiring ethical approach about environmental problems and in transforming sustainable life principles into practice. On the other hand, student teachers should be informed about the negative effects on environment in order to achieve these roles (Keleş, Uzun and Özsoy, 2008). In addition, pre-service teachers should teach people's responbility towards the nature and the need of people regarding the nature. Kim and Fortner (2006) argued that the environmental approach of teachers is one of the significant factors affecting their focus on environmental topics (Akıllı ve Yurtcan, 2009). It is certain that information is also significant in this regard. Summers et. al. (2000) argued that for best teaching practices information is needed. Therefore, all teachers are expected to have necessary information and sensitivity

about environment. Because only sensitive and conscious teachers can deliver an efficient environmental education (Özcan, 2010).

It is thought that through this study which aims at analysing the moral considerations of pre-service science teachers about environment and their attitudes towards sustainable environment the perceptions of pre-service teachers about the environmental problems could be improved. There are numerous studies on interest, attitudes, sensitivity and awareness about environment (Şama, 2003; Özmen, Çetinkaya and Nehir, 2005; Erol and Gezer, 2006; Aksu, 2009), about moral considerations about environment (Yapıcı, 2009; Erten, 2008; Karahan, 2009; Çobanoğlu, Karakaya and Türer, 2012; Özdemir, 2012; Özer, 2015) and about attitudes towards sustainable environment (Yıldız, 2011; Ergün and Çobanoğlu, 2012; Aydın and Ünaldı, 2013; Gürbüz, Çakmak and Derman, 2013; Öztürk Demirbaş, 2015). However, in these studies the correlation between the ethical understanding under these tendencies and the attitudes towards sustainable environment has not been examined. Therefore, this study fills this gap in the related literature and it is thought to provide a different dimension to environmental education.

The aims of this study are to reveal ecocentric and anthropocentric attitudes as well as hostile attitudes of pre-service science teachers towards environment and sustainable environment and to identify whether or not these attitudes are interrelated. In parallel to these aims the study attempts to answer the following research questions:

1. At which level do the participants have ecocentric, anthropocentric attitudes and hostile attitudes towards environment?
2. At which level do the participants have attitudes towards sustainable environment?
3. Are their scores from the scale of ecocentric, anthropocentric and hostile attitudes towards environment and the sustainable environmental attitude scale significantly related?

Methodology

The study was designed as a descriptive research and employed relational model. In such models the goal is to identify the simultaneous change level in two or more variables (Karasar, 2011).

Working Group

The participants of the study were 1438 pre-service science teachers attending public universities in the Aegean region of Turkey (namely, Adnan Menderes University, Ege University, Dokuz Eylül University, Pamukkale University, Muğla Sıtkı Koçman University, Afyon Kocatepe University, Uşak University, Dumlupınar University, and Manisa Celal Bayar University).

Data collection tools

The data of the study were collected using two tools: "the scale of ecocentric, anthropocentric and hostile attitudes towards environment" and "the sustainable environmental attitude scale". Of these scales the former one was developed by

Thompson and Barton (1994) in the USA and then, it was adapted to German by Siegrist in 1996. The scale was translated from both English and German into Turkish by Erten in 2008 together with validy and reliability studies. The scale of ecocentric, antropocentric and antipathic attitudes towards environment has three factors. The first one is “Ecocentric attitudes”. The second and third factors deal with anthropocentric and hostile attitudes towards environment, respectively. The scale has a total of 26 items. In the first factor there are 11 items, in the second factor there are 8 items and the last factor includes 7 items. There is no reversely stated item in the scale. The minimum score in the scale is 26, while the maximum score is 182. The items of the scale are answered using 7-point grading likert type scale. In the study confirmatory factor analysis produced the RMSEA value of .08; p=.000. The RMSEA values of 0.08 or lower indicates that the model is acceptable (Hoe, 2008). Therefore, the scale model used in the study is acceptable. Erten (2007) found the Cronbach α coefficient for the first factor to be .77. It was found to be .78 and .92, for the second and third factors, respectively. In the current study, these coefficients were found to be .84 for the first factor, .85 for the second factor and .89 for the third factor.

The other scale used in the study, namely the sustainable environmental attitude scale, was developed by Yıldız (2011). The scale is consisted of 27 items. The original scale consisted of three factors. In the current study the confirmatory factor analysis produced the value of $X^2/df = 10$, indicating the problematic pattern of the scale model. Then, the exploratory factor analysis was employed and it revealed that those items of which the factor load was under.30 (namely, 13, 16 and 17. items) were omitted from the scale. The factor load values of .45 or higher indicate the eligible items. However, it was reported that this limit may be reduced to .30 for few items (Büyüköztürk, 2014). In the current analysis it was found that the scale has five dimensions and the confirmatory factor analysis provided the X^2/df value of 4. Given that it is lower than 5, the scale model has a good consistency (Çokluk, Şekercioğlu and Büyüköztürk, 2010). The confirmatory factor analysis also provided the followings: $X^2= 848.138$, sd=242; RMSEA= 0.0417, p=0.000; AGFI=.94; CFI=.95; GFI=.95.

The first dimension of the scale is consisted of the following items: 1, 2, 3, 4, 5 and 6. It deals with individuals’ anxiety levels about environmental problems and called anxiety about environmental problems. The second dimension includes the items of 7, 8 and 9. It is concerned with the measurement of individuals’ ignorance about environment and environmental problems. The dimension is called ignorance about environment and environmental problems. The third factor, consisting of 11, 12, 14, 15, 18, 19 and 21. items, deals with individuals’ attitudes towards recycling and is called “recycling for sustainable environment”. The fourth dimension, which includes the items of 10, 20, 22, 23 and 24, is concerned with negative views about sustainable environment and therefore, is called negative views about sustainable environment. The items of 25, 26 and 27 are included in the fifth dimension, which is concerned with individuals’ attitudes towards the significance and necessity of sustainable environment. It is called the significance of sustainability. The Cronbach Alpha coefficients of the dimensions were found to be .84 for the dimension of anxiety about environmental problems, .83 for the dimension of ignorance about environment and environmental problems, .75 for the dimension of recycling for sustainable environment, .74 for the dimension of negative views about sustainable environment, and .77 for the dimension of the significance of sustainability. The Cronbach Alpha coefficient for the scale as a whole was found to be .89. The minimum and maximum scores are 24 and 120, respectively.

The mean total scale score (X) is calculated X=72,00 (Maximum score in the scale+Minumum score in the scale / 2).

Gathering Data

The data of the study were obtained through two scales, the scale of ecocentric, antropocentric and hostile attitudes towards environment" and the sustainable environmental attitude scale. These scales was administered by the author following granting the official permissions of the universities: Adnan Menderes University, Ege University, Dokuz Eylül University, Pamukkale University, Muğla Sıtkı Koçman University, Afyon Kocatepe University, Uşak University, Dumlupınar University, and Manisa Celal Bayar University. The scales were to pre-service teachers at the related universities. Administration of the scales lasted nearly for 15-20 minutes. As stated earlier, the study was carried out in the school year of 2014-2015.

Analyzing Data

The data obtained were examined using descriptive statistics (frequency, arithmetical mean, standard deviation and percentage).

Participants' scores in the scale of ecocentric, antropocentric and hostile attitudes towards environment and in the sustainable environmental attitude scale were examined using the normality test and found that the scores were not normally distributed ($p< ,05$).

In order to determine the correlation between participants' scores in the scale of ecocentric, antropocentric and hostile attitudes towards environment and their scores in the sustainable environmental attitude scale the Sperman Brown rank order correlation analysis was employed. This analysis is employed to uncover correlation between variables when the distribution is not normally distributed (Büyüköztürk, 2008).

Findings

1. Participants' ecocentric, antropocentric attitudes and hostile attitudes towards environment

The first research question is as follows: "at which level do the participants have ecocentric, antropocentric attitudes and hostile attitudes towards environment?". In order to answer this question the arithmetic mean (X) and standard deviations (SDs) of the scores of the participants in three dimensions of the the scale of ecocentric, antropocentric and hostile attitudes towards environment were found and these are given in Table 1, Table 2, and Table 3.

Table 1.

Ecocentric attitude scores of pre-service science teachers

	N	X	S.D.	Min	Max
Ecocentric attitude scores	*1438*	*63,51*	*6,477*	*46*	*77*

Table 1 shows that the participants had a mean score of X=63,51 in the ecocentric attitudes dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment. Given that it is higher than mean score of the scale (X=44,00), it seems that the participants generally had an ecocentric attitude. In other words, the pre-service science teachers participated in the study owned and protected environments with any personal interest.

Table 2.

Anthropocentric attitude scores of pre-service science teachers

	N	X	S.D.	Min	Max
Anthropocentric attitude scores	*1438*	*43,41*	*6,483*	*26*	*56*

Table 2 indicates that in the anthropocentric attitudes dimension of the scale of ecocentric, anthropocentric attitudes and hostile attitudes towards environment the participants had a mean score X=43,41. Given that their mean score is higher than the mean score of the scale (X=32,00), it is safe to argue that the participants had a moderate approach in regard to a human-centered thinking system.

Table 3.

Hostile attitude scores of pre-service science teachers

	N	X	S.D.	Min	Max
Hostile attitude scores	*1438*	*15,48*	*5,612*	*7*	*31*

As can be seen in Table 3 in the hostile attitudes dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment the participants had a mean score of X=15,48. This score is lower than the mean score of the scale (X=28,00), therefore, it is possible to argue that the participants had less hostile attitude towards environmant.

2. Participants' attitudes towards sustainable environment

The second research question is as follows: At which level do the participants have attitudes towards sustainable environment? The results of the analysis carried out to answer it are given in Table 4, which presents the related arithmetic mean (X) and standard deviation (S.D.).

Table 4.

Participants' scores in the the sustainable environmental attitude scale

	N	*X*	*S.D.*	*Min*	*Max*
Anxiety about environmental problems	*1438*	*25,05*	*3,708*	*6*	*30*
İgnorance about environment and environmental problems	*1438*	*12,85*	*2,480*	*3*	*17*
Recycling for sustainable environment	*1438*	*24,42*	*3,192*	*10*	*30*
Negative views about sustainable environment	*1438*	*17,02*	*2,537*	*4*	*20*
Significance of sustainability	*1438*	*12,71*	*2,011*	*3*	*15*
Sustainable environmental attitude scale scores	*1438*	*100,51*	*10,943*	*68*	*120*

Table 4 indicates that the participants had a mean total score of X=100,51 in the sustainable environmental attitude scale. Given that it is higher than the mean total scale score (X=72,00), it is safe to state that the participants had higher levels of and positive attitudes towards sustainable environment.

3. Relationship between participants' scores from the scale of ecocentric, anthropocentric and hostile attitudes towards environment, and from the sustainable environmental attitude scale

The third research question is as follows: Are participants' scores from the scale of ecocentric, anthropocentric and hostile attitudes towards environment and the sustainable environmental attitude scale significantly related?

Table 5 presents the results of the Sperman Brown rank order correlation analysis which carried out to determine whether or not participants' scores from the scale of ecocentric, anthropocentric and hostile attitudes towards environment and the sustainable environmental attitude scale significantly related.

Table 5.

Results of the Sperman Brown rank order correlation analysis

			Sustainable environmental attitude scale					
			Anxietyabout environmental problems	*İgnorance about environment and environmental problems*	*Recycling for sustainable environment*	*Negative views about sustainable environment*	*Significance of sustainability*	*Sustainable environmental attitude scale scores*
Ecocentric, antropocentric and hostile attitudes towards environment scale	*Ecocentric attitude*	***N***	*1438*	*1438*	*1438*	*1438*	*1438*	*1438*
		r	*,338***	*,236***	*,369***	*,268***	*,328***	*,387***
		p	*,000*	*,000*	*,000*	*,000*	*,000*	*,000*
	Anthropocentric attitude	***N***	*1438*	*1438*	*1438*	*1438*	*1438*	*1438*
		r	*,113***	*-,002*	*,113***	*,035*	*,118***	*,092***
		p	*,000*	*,935*	*,000*	*,184*	*,000*	*,000*
	Hostile attitude	***N***	*1438*	*1438*	*1438*	*1438*	*1438*	*1438*
		r	*-,339***	*-,375***	*-,352***	*-,421***	*-,343***	*-,461***
		p	*,000*	*,000*	*,000*	*,000*	*,000*	*,000*

As can be seen in Table 5 the mean scores of participants in the ecocentric attitude dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment has a moderate, positive significant correlation with their scores in the sustainable environmental attitude scale (r=,338, p<,001; r=,236, p<,001; r=,369, p<,001; r=,268, p<,001; r=,328, p<,001; r=,387, p<,001). Therefore, it is safe to argue that their scores in the ecocentric attitude dimension increases in parallel to increase in their scores in the sustainable environmental attitude scale.

It was also found that their scores in anthropocentric attitude dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment were significantly and positively related to their scores in the dimension of anxiety about environmental problems, the recycling dimension and the significance of sustainable environment dimension of the sustainable environmental attitude scale as well as the overall sustainable environmental attitude scale scores (r=,113, p<,001; r=,113,

p<,001; r=,118, p<,001; r=,092, p<,001). However, their scores in the anthropocentric attitude dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment were insignificantly correlated with their scores in the dimensions of ignorance and negative views about sustainable environment of the sustainable environmental attitude scale (r= -,002, p>,001; r=,035, p>,001). Therefore, when their scores in the anthropocentric attitude dimension increase, their scores related to their attitudes towards sustainable environment increase.

It was also found that participants' scores in the dimension of hostile attitude towards sustainable environment of the scale of ecocentric, anthropocentric and hostile attitudes towards environment were moderately, negatively and significantly related to their scores in the sustainable environmental attitude scale (r= -,339, p<,001; r= -,375, p<,001; r= -,352, p<,001; r= -,421, p<,001; r= -,343, p<,001; r= -,461, p<,001). Therefore, when their scores in the hostile attitude dimension increases, their scores in the the sustainable environmental attitude scale decreases.

Results and Discusiion

In the ecocentric attitudes dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment the participants had a mean score of X=63,51, indicating that the participants had generally ecoentric approach. this finding suggests that the participants regarded the nature as the basis of their relationship with environment, they considered themselves as part of environment and had an awareness of the fact that the nature does not need human being to survive, but people need the nature to survive. This findings is consistent with previous findings. Erten (2008) found that both Turkish and German teachers had positive ecocentric attitude scores. Turkish teachers' mean score for ecocentric attitude was X=74,90, while it was X=67,60 for German teachers. Karahan (2009) found that nursing students had a mean score of X=62,28 for ecocentric attitude. Erten and Aydoğdu (2011) concluded that both Turkish and Azari students had higher ecocentric attitude scores, X=69,28 and X=66,80, respectively. Çobanoğlu et. al. (2012) determined that 62,9 % of pre-service classroom teachers had an ecocentric perspective. Karakaya and Çobanoğlu (2012) found that 85% of senior pre-service teachers had an ecocentric approach. All these findings suggest that students, pre-service teachers and teachers have mostly an ethical approach in which environment is considered to be the center of the relationships between people. Therefore, it can be argued that the participants had the necessary approach towards the solution of environmental problems.

Concerning the anthropocentric attitudes dimension of the scale of ecocentric, anthropocentric attitudes and hostile attitudes towards environment the participants had a mean score X=43,41. This findings indicates that for the participants people are in the central position in their relationships with environment. This findings is consistent with previous findings. Erten (2008) found that both Turkish and German teachers had higher anthropocentric attitude scores than the mean score. It was found that the anthropocentric attitude score of Turkish teachers was X=44,00, while it was X=36,90 for German teachers. found that nursing students had a mean score of X=43,66 for anthropocentric attitude. Erten and Aydoğdu (2011) concluded that both Turkish and Azari students had higher anthropocentric attitude scores, X=45,02 and X=44,95, respectively. Karakaya and Çobanoğlu (2012) found that students had a human-oriented environmental approaches. All these findings suggest that the participants had a human-oriented ethical approach in terms of their acts due to the results of this

approach may serve for both living beings-oriented and environment-oriented ethical values.

However, different ethical approaches may emerge in terms of ulitmate goals. For instance, a person may protect environment to make the nature useful for himself and for next generations, while the other one may protect it based on the assumption that each living beings has an right to survive. This finding suggests that there is lack of "ethics-oriented teaching" in environmental education. Currently, in the course of environmental science student teachers are given theoretical information about the significance of environment and its protection. Given that this course lacks of "ethics-oriented teaching" it leads to conflicts in students teachers about the reasons for the protection of environment. Therefore, in order to avoid such conflicts environmental education should be delivered through ethics-oriented teaching.

In the hostile attitudes dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment the participants had a mean score of X=15,48. This finding shows that the participants had less hostile attitude towards environmant. This findings is consistent with previous findings. Erten (2008) found that both Turkish and German teachers had low hostile attitude scores, X=16,90 and X=17,40, respectively. Karahan (2009) found that nursing students had a mean score of X=17,88 for hostile attitude towards environment. Erten and Aydoğdu (2011) found that Turkish and Azari students had low hostile attitude scores, X=14,06 and X=20,95, respectively. The findings showed that the participants had no hostile attitudes towards environment.

Participants' mean scores in the sustainable environment attitude scale was found to be X=100,51. The findings indicated that the pre-service science teachers participated in the study had high levels of positive attitudes towards sustainable environment. There are studies about the attitudes towards sustainable environmet in which different groups of participants took part (Tuncer et. al., 2006; Tuncer, 2008; Ruff and Olson, 2009; Şahin, Ertepınar and Teksöz, 2009; Şahin and Erkal, 2010; Yıldız, 2011; Aydın and Ünaldı, 2013; Gürbüz et. al., 2013). Şahin et. al. (2009) also analysed the attitudes of pre-service teachers towards sustainable environment. The attitudes of student teachers were found to be positive and to have internalized values about sustainable development. Yıldız (2011) concluded that the third and fourth grade science teachers had a mean score of X=115 in regard to the sustainable environment attitude. Given that the maximum score in the scale was X=135 they had a positive attitude towards sustainable environment. Aydın and Ünaldı (2013) analysed pre-service geography teachers' attitudes towards sustainable environment and found that they had positive and high levels of attitudes towards sustainable environment. Gürbüz et. al. (2013) dealt with the relationship between gender, grade level and sources used to be informed about environment and attitudes towards sustainable environment of pre-service biology teachers. They also found that the participants higher levels of attitudes towards sustainable environment. These findings seem to be consistent with the current finding. Demirbaş Öztürk (2015) analysed the awareness of pre-service teachers about sustainable development. It was found that their awareness about sustainable development was at high levels regarding "environmental ethics", and "societal factors", but it was moderate concerning the "environmental economy factor". All these findings suggest that the participants had environmental attitudes and values concerning sustainable environment in relation to the solutions of environmental problems.

The mean scores of participants in the ecocentric attitude dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment was found to have a moderate, positive significant correlation with their scores in the sustainable environmental attitude scale. Therefore, their scores in both scales increase simultaneously. Although the major goal of the sustainable development approach is not to protect environment, it contributes to protect it and to environment-oriented ethics.

Their scores in anthropocentric attitude dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment were significantly and positively related to their scores in the dimension of anxiety about environmental problems, the recycling dimension and the significance of sustainable environment dimension of the sustainable environmental attitude scale as well as the overall sustainable environmental attitude scale scores. However, their scores in the anthropocentric attitude dimension of the scale of ecocentric, anthropocentric and hostile attitudes towards environment were insignificantly correlated with their scores in the dimensions of ignarance and negative views about sustainable environment of the sustainable environmental attitude scale. Therefore, when their scores in the anthropocentric attitude dimension increase, their scores related to their attitudes towards sustainable environment increase. It is reported that the sustainable development understanding put people under obligation for future generations and regards the nature as a resource and therefore, it is human-centered in terms of ethics (Ergün, and Çobanoğlu, 2012).

It was also found that participants' scores in the dimension of hostile attitude towards sustainable environment of the scale of ecocentric, anthropocentric and hostile attitudes towards environment were moderately, negatively and significantly related to their scores in the sustainable environmental attitude scale. Therefore, when their scores in the hostile attitude dimension increases, their scores in the the sustainable environmental attitude scale decreases. Sustainable development understanding states that hostile acts include damaging the natural balance and uncounsciously consuming the natural resources.

In accordance with the ultimate goals of sustainable development it is positive that the participants had ecocentric and anthropocentric attitudes. However, anthropocentric pre-service teachers focuses on the economic dimension of sustainable development, ecocentric pre-service teachers emphasized the social and ecological dimensions. The fact that sustainable development is based on the present economic system and that economy remains being dependent on technology make solutions to environmental problems limited. Environmental problems occur due to the anthropogenic factors. Therefore, trying to find solutions based on these factors makes it difficult to achieve the goal of eliminating environmental problems. Producing ecocentric pre-service teachers with sustainable environment instead of sustainable development may contribute to active and effcient solutions to environmental problems. In order to avoid ethical confusion observed in the participants productive and ethics-based environmental education can be delivered. The review of literature showed that the studies carried out have not focus on the relationship between ecocentric, anthropocentric and hostile attitudes and attitudes towards sustainable environment. Therefore, it can be argued that the study contributes to the related literature.

Based on the conclusions given above the following suggestions are develop to guide future studies on ethical environmental approaches of teachers, student teachers.

- Although the participants were found to have a positive attitudes towards and approaches about the solutions of environmental problems, it cannot be ignored that their perceptions about environment are mostly human-centered. Although their approach is consistent, they are not clear about the reasons for it. Therefore, they should be guided in this respect. An expanded and comprehensive environmental education can be delivered to make them more clear about their environmental approach.

- The participants of the study were those pre-services science teachers attending universities in the Aegean region. Therefore, other groups of pre-service teachers may be included in future studies.

- The study was carried out on pre-service teachers. Similar studies can be repeated on samples of preschool students, basic education students and secondary school students since these groups are in the process of developing environmental perceptions and attitudes towards sustainable environment.

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RESEARCH ARTICLE

Fen Bilgisi Öğretmen Adaylarının Çevreye Yönelik Etik Yaklaşımlari ile Sürdürülebilir Çevreye Yönelik Tutumlarının İncelenmesi

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Özet

Bu çalışmada fen bilgisi öğretmen adaylarının çevreye yönelik etik yaklaşımları ile sürdürülebilir çevreye yönelik tutumlarının incelenmesi amaçlanmıştır. Araştırma, 2014-2015 eğitim öğretim yılında Ege bölgesindeki üniversitelerin Eğitim Fakültesi Fen Bilgisi Eğitimi Anabilim Dalında öğrenim görmekte olan toplam 1438 fen bilgisi öğretmen adayının katılımıyla gerçekleştirilmiştir. Veri toplama aracı olarak; "Ekosentrik, Antroposentrik ve Çevreye Yönelik Antipatik Tutum Ölçeği" ve "Sürdürülebilir Çevre Tutum Ölçeği" kullanılmıştır. Verilerin analizinde betimsel istatistikler kullanılmıştır. Betimsel istatistiklere ek olarak, fen bilgisi öğretmen adaylarının ekosentrik antroposentrik ve çevreye yönelik antipatik tutumları ile sürdürülebilir çevreye yönelik tutumları arasındaki ilişkiyi belirlemek için; Sperman Brown Sıra Farkları Korelâsyonu kullanılmıştır. Çalışmanın sonucunda fen bilgisi öğretmen adaylarının, genel olarak ekosentrik tutuma sahip olduğu ve sürdürülebilir çevreye yönelik tutumlarının olumlu düzeyde olduğu belirlenmiştir. Ayrıca, fen bilgisi öğretmen adaylarının çevreye yönelik ekosentrik ve antroposentrik tutum puanları arttıkça sürdürülebilir çevreye yönelik tutum puanlarının da arttığı buna karşın çevreye yönelik antipatik tutum puanları arttıkça sürdürülebilir çevreye yönelik tutum puanlarının azaldığı tespit edilmiştir. Elde edilen bulgular ışığında, önerilerde bulunulmuştur.

Anahtar Kelimeler: Sürdürülebilir Çevre, Çevre Etiği, Çevre Eğitimi

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