

A CONCEPTUAL MODEL OF RELATIONSHIPS AMONG ECOLOGICAL
WORLDVIEW, FUNDAMENTAL VALUES, PERSONAL NORM AND SELF-
IDENTITY

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ABSTRACT

A CONCEPTUAL MODEL OF RELATIONSHIPS AMONG ECOLOGICAL WORLDVIEW, FUNDAMENTAL VALUES, PERSONAL NORM AND SELF- IDENTITY

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A model was proposed to explain how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity are related to personal norm. The model assumed that self-identity influence personal norms directly and indirectly through fundamental values and ecological worldviews. In addition, fundamental values have an effect on personal norm directly and indirectly through ecological worldviews. Lastly, it was assumed that ecological worldviews influence personal norms directly. Investigating middle school students' pre-service science teachers' and science teachers' ecological worldviews, fundamental values, personal norms and self-identities was also aimed. There were 2396 people in pilot study and 5078 people in main study including middle school students ($N=3733$), pre-service science teachers ($N=720$) and science teachers ($N=601$) in four cities in Turkey. New Ecological Paradigm Scale (NEP), Self-Identity Scale, Fundamental Values Scale and Personal Norm Scale were used as data collection tools. Results of path

analysis indicated that given the results for variation, the result of this model proposing direct effect showed that 80%, 68% and 59% of the variance of personal norm was explained by the variables in the model for middle school students, pre-service science teachers and science teachers, respectively. In addition, NEP scores are moderate level for all participants, while fundamental values, personal norm and self-identity means of middle school students was significantly lower than means of science teachers and pre-service science teachers. After validity and reliability analysis, adapted and validated scales were obtained.

Key Words: Ecological Worldview, Fundamental Values, Personal Norm, Self-Identity, Conceptual Model

ÖZ

EKOLOJİK DÜNYA GÖRÜŞÜ, TEMEL DEĞERLER, KİŞİSEL NORM VE ÖZ KİMLİK ARASINDAKİ İLİŞKİLERİ AÇIKLAYAN KAVRAMSAL MODEL

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Bu araştırmada ekolojik dünya görüşü (İnsan ve Doğa Temelli), temel değerler (biyosferik, özgecil ve egoistik değer) ve öz-kimliğin ahlaki normlar ile ne düzeyde ilgili olduğunu belirlemek için kavramsal model çizilmiştir. Bu modele göre, öz-kimliğin ahlaki normlar üzerinde doğrudan ya da ekolojik dünya görüşü ve temel değer üzerinden dolaylı olarak bir etkisi vardır. Ayrıca, temel değerlerin ahlaki normlar üzerinde doğrudan ya da ekolojik dünya görüşü üzerinden dolaylı olarak bir etkisi vardır. Son olarak, bu modelde ekolojik dünya görüşünün ahlaki normlar üzerinde doğrudan bir etkisinin olduğu varsayılmıştır. Ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşlerinin, temel değerlerin, insan doğa etkileşimine yönelik ahlaki normlarını ve öz kimliklerinin incelenmesi de amaçlanmıştır. Araştırmanın verilerinin toplanması sırasında pilot çalışma esnasında 2396 kişiye ulaşılrken asıl çalışmada ise ortaokul öğrencileri ($N=3733$), fen bilimleri öğretmen adayları ($N=720$) ve fen bilimleri

öğretmenlerinin ($N=601$) yer aldığı 5078 kişiden veriler toplanmıştır. Veri toplama araçları arasında Ekolojik Dünya Görüşü Ölçeği, Temel Değerler Ölçeği, Ahlaki Norm Ölçeği ve Öz Kimlik Ölçeği yer almaktadır. Yol analizi sonuçlarına göre, Path analizi sonuçlarına göre, bu model ortaokul öğrencileri, fen bilimleri öğretmen adayları ve fen bilimleri öğretmenleri örneklemi için sırasıyla %80, %68 ve %59 oranlarında ahlaki normu açıklayamıştır. Araştırmanın sonuçlarına göre, ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin insan ve doğa etkileşimine yönelik ekolojik dünya görüşleri puanları ortalama düzeydedir. Fakat ortaokul öğrencilerinin temel değerler, öz kimlik ve ahlaki normlar değişkenlerine yönelik ortalama puanları fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ortalama puanlarından istatistiksel olarak daha düşük düzeyde çıkmıştır.

Anahtar Kelimeler: Ekolojik Dünya Görüşü, Temel Değerler, Kişisel Norm, Öz Kimlik, Kavramsal Model

To My Parents

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LIST OF ABBREVIATIONS

MoNE	Ministry of National Education
NEP	New Ecological Paradigm
SD	Standard Deviation
df	Degrees of freedom
N	The Number of Sample
EPA	Environmental Protection Agency
MSS	Middle School Students
PST	Pre-Service Science Teachers
ST	Science Teachers

CHAPTER 1

INTRODUCTION

Throughout the centuries, human beings interacting with nature, earth and all other living things began to deteriorate in the course of time, with each passing century and move away from them (Schultz, 2011). Harmful effects caused by people were started with industrialization, technological developments, urbanization and population affecting on nature in a negative way (Colucci-Gray, Perazzone, Dodman & Camino, 2013; Feldman & Nation, 2015). Especially, in the 19th century, human beings entered into a rapid technological change process, at which time they realized the damage to the environment and natural life and began to take measures (Choi, Lee, Shin, Kim, & Krajcik, 2011). Humanbeing cause an environmental crisis that influences both today's generation and future generations by overusing the Earth's natural sources (Cairns, 2002). Although the world is quite large, because of detrimental effect of humanbeing on nature, recent studies showed that world hasn't met the demand of all living beings' needs since the beginning of the 70s (Living Planet Report, 2014). Failure to meet this demand leads to environmental problems which were seen as water and air pollution a few decades ago have been shown to extend to toxic waste, industrial agriculture, raw materials and energy, burning fossil fuels, fast decline of forests and desertification, depletion of the ozone layer, the destruction of biological diversity in nature, pollution of the seas and oceans, greenhouse gas emissions, and climate change (Dunlap, Liere, Mertig & Jones, 2000; Environmental Protection Agency [EPA], 2016; Feldman & Nation, 2015; Steg, & Vlek, 2009; Winter, & Koger, 2004). In addition, causes of these kinds of environmental problems are complex and synergistic and solving these problems is problematic and complicated (Stern, Young, & Druckman, 1992). The

deteriorating of the environment has become a leading concern for all societies (Diekmann & Franzen, 2019) and interest in environmental problems has increased both in national and international level (Dunlap, et al., 2000). The researchers who are interested in comprehending how people perceive environmental problems pay attention to these new emerging elements of views (Stern, Dietz, Kalof & Guagnano, 1995), and the number of public perception studies on issues is increasing (O'Connor, Bord, & Fisher, 1999). Especially, emphasis to environmental concerns has increased among researchers and policy-makers who are interested in how individual beliefs inform and ultimately influence environmental decisions (Amburgey & Thoman, 2012). In addition to beliefs, personal norm and self-identity related to environmental issues also gain importance for researchers. In the last a few decade, many study results have suggested that values, ecological worldviews, personal norm and self-identity are interrelated (e.g., Dunlap & Van Liere 1978; Dunlap, Van Liere, Mertig, & Jones, 2000; Schwartz, 1977; Sherwood, 1965; Stern, 2000; Stets & Biga, 2003).

Considering the effect of these environmental psychology factors on human being, among them personal norm was defined by Schwartz (1977) as people's own expectations based upon internalized values in norm-activation model proposed to account for pro-social behaviors in which pro-social behaviors is expected to follow from personal norms reflecting "*feelings of moral obligation to perform or refrain from specific actions*" (Schwartz & Howard, 1981, p. 191). Personal norms were firstly developed to account for altruistic behavior in norm-activation model and formed the core of this model (Schwartz, 1977). The model indicated that personal norms are formed by two factors: the feeling of responsibility for acting the certain behavior and the awareness that acting (or not acting) the particular behavior has specific results (Schwartz, 1977). Personal norms are also actuated by beliefs that environmental situations present threat things the people values and beliefs that the people can act to reduce this threat (Schwartz 1977). In addition, researchers has studied personal norm different point of views to form deeper understanding of its function in clarifying the

human-nature relationship (e.g., Clark, Kotchen, & Moore, 2003; Steg & de Groot, 2010; Stern Dietz, Abel, & Guagnano, 1995; Wynveen, Kyle, & Tarrant, 2012).

Because NEP reflects the general individuals' mental state beliefs related to the environment, it may be supposed that New Ecological Paradigm (NEP) can influence pro-environmental personal norm of individuals (Stern et al., 1999). New Ecological Paradigm measuring ecological worldviews are beliefs of people related to the natural world and the relationship between human and nature and affects how people assess and respond to hazards caused by human being (Dunlap & Van Liere 1978; Dunlap et al. 2000). Ecological worldviews is *"focused on beliefs about humanity's ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity's right to rule over the rest of nature"* (Dunlap et al., 2000; p.427). It can be also said that NEP is a *"measure of endorsement of a pro-ecological world view and it is used extensively in environmental education explained by underlying values, a world view, or a paradigm"* (Anderson, 2012, p.260). According to NEP, society participates in the process of changing the vision of the environment (Corral-Verdugo & Armendariz, 2000). It includes various expressions related to environmental concern such as, intentions, attitudes, beliefs and behavior, environmental concerns about various environmental issues such as natural resources and pollution and measure general beliefs related to human-environment relationship (Hawcroft & Milfont, 2010). Most of the researchers also stated that since NEP focuses on people' general ecological worldview beliefs, it also plays an essential role in shaping personal norm (e.g., Steg & De Groot, 2010; Stern et al., 2005).

Schwartz (1977) suggested that personal norms derive from values and reflect dependence to internalized values, meaning that people feel that they have to act according to their common values morally. Stern et al. (1999) and Stern (2000) stated that personal norms are affected by fundamental values. Data from many

researches indicate that altruistic value is the most strongly implicated variable to activate personal norms (e.g., Karp, 1996; Stern et al., 1999), though other value types are also related. Egoistic values are negatively related to personal norms in several studies (e.g., Stern et al., 1999). Many studies also showed that values have an effect on personal norm as well as ecological worldview (e.g., Poortinga, Steg, & Vlek, 2004; Steg, Drijerink, & Abrahamse, 2005). For example, according to Stern (2000), human values influence individual's beliefs and in-turn, the beliefs affect individual's personal norms. In one more study, De Groot and Steg (2007) examined relationship between fundamental values and personal norms and found that the most strongly and positively correlation of personal norm occurred with biospheric value ($r = .55$). Personal norm was also positively correlated with the altruistic value ($r = .32$) and negatively correlated with the egoistic value ($r = -.31$). The three fundamental values were able to account for 21% of the variance in personal norm. In addition, it was found that the more participants endorsed value the environment and biosphere the stronger their personal norms ($\beta_{\text{bio}} = .40$), while the more participants endorsed to egoistic values, the lower their personal norms ($\beta_{\text{ego}} = -.20$). Steg, de Groot, Drijerink, Abrahamse, and Siero (2011) focused on the relationship between fundamental values, NEP and personal norms and found that among fundamental values, while biospheric ($\beta = .49$) and altruistic values ($\beta = .21$) were strongly and positively related to personal norms illustrating that stronger biospheric and altruistic values were related to stronger personal norms, egoistic values ($\beta = -.11$) were negatively but not strongly related to personal norms. Consequently, values accounted for 41% of the variance in personal norms. The NEP ($\beta = .37$) accounted for 13% of the variance in personal norms meaning that a higher score on the NEP was related to stronger feelings of moral obligation to behave environmentally. In line with the related research, current dissertation propose a relationship between ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) self-identity and personal norm. More detail about this relationship is involved in further sections.

1.1. Overview of the Proposed Model

Current study presents a conceptual model explaining how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity are related to personal norm. In Figure 2, based on the theoretical and empirical evidence obtained from the results of previous studies, a structural model indicating the assumed relationships between these constructs was presented (e.g., de Groot & Steg, 2007; Schwartz 1977; Schwartz, 1994; Sherwood, 1965; Stern, 2000; Stern et al., 1999; Stryker, 1968). Among the previous studies, firstly, while presenting the conceptual model in the current study, the model was formed mainly based on proposing Value Belief Norm Theory (VBN) (see Figure 1) developed and tested by Stern et al. (1999). Considering the theory in detail, it links three other theories [Value Theory, New Environmental Paradigm (NEP), and Norm-Activation Theory]. According to value theory developed by Schwartz (1992), values can be used as predictors of behaviors through personal norms. The theory initially had 56 fundamental values including 10 motivational types of values which have a two-dimensional space that consists of four separate value clusters including openness to change versus conservatism and self-enhancement versus self-transcendence. A series of by Stern and his colleagues (Stern, 2000; Stern, Dietz & Kalof, 1993) argued three different fundamental values: an egoistic, a social-altruistic, and a biospheric value and assumed that each value ensures that the individual is sensitive to certain outcomes. Egoistic individuals attach importance to own interests and desires in terms of using natural resources. The belief that it will have negative consequences on itself will trigger an egoistic environmental behavior. People with social-altruistic value put an emphasis on the welfare of other people. For a person who has a strong social-altruistic value, the belief that an environmental condition has negative consequences for other people will lead to behavior in favor of the environment by activating personal norms. People with biospheric value focus on the ecosystem and biosphere (de Groot & Steg, 2007). The theory also postulates that NEP is mediated between fundamental

values and personal norms. Lastly, norm-activation theory developed by Schwartz (1977) clarifies pro-social behaviors which are expected to follow from personal norms (Schwartz & Howard, 1981). Environment related personal norm involved in this theory induce pro-environmental behavior that is a sense of moral imperative to contribute to the protection of the nature (Hartmann, Apaolaza & D’Souza, 2018). The personal norm is seemed as a part of the normative driver of pro-environmentally behaviors (Wang, Wang, Ru, Li & Zhao, 2019). Personal norm is also provided to activate beliefs and values (Stern, 2000; Stern et al., 1999; Stern, Dietz, Kalof, & Guagnano, 1995). These psychological variables moderate the effects of personal norms on pro-environmental behaviours in VBN theory. This model was used in the environmental context studies why people are engage in pro-environmental behaviors such as energy conservation (e.g., Tyler, Orwin, & Schurer, 1982), environmental citizenship (e.g., Stern et al., 1999), willingness to reduce car use (e.g., Eriksson, Garvill, & Nordlund, 2006) and recycling (e.g., Vining & Ebreo, 1992).

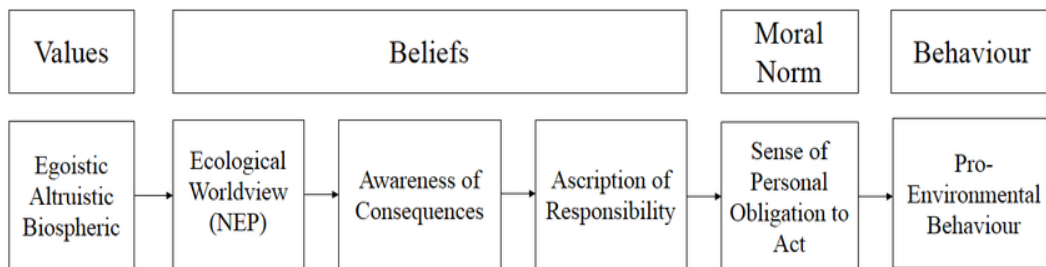


Figure 1. Value-Belief-Norm Theory (adapted from Stern, 2000)

Secondly, self-identity in the proposed model in the current study is another variable influencing the psychological variables including fundamental values, NEP and personal norm. Self-identity concept and its relationship between the psychological variables is also involved in theoretical and empirical studies related to environmental psychology (e.g., Fielding et al., 2008; Hitlin, 2003; Gatersleben, Murtagh & Abrahamse, 2014; Snelgar, 2003; Steg & De Groot, 2012; Walton & Jones, 2018; Van der Werff, Steg & Keizer, 2014). For example, Stets and Biga (2003) suggested to bring the concept of identity into

environmental sociology since it was thought that these two concepts are related each other. Gatersleben, Murtagh and Abrahamse (2014) stated that if people define themselves as environmentally friendly, they are likely to have strong pro-environmental values. In other words, values represent what individuals see important in their lives and therefore influence how individuals want to see themselves, what kind of individuals they want to be and how they see themselves and this means that values can affect one's self-identity (Van der Werff et al., 2014).

Accordingly, in the current study, the proposed model assumed that self-identity influence positively personal norm directly and indirectly through its effect on fundamental values (egoistic, biospheric and altruistic) and ecological worldviews (human based and nature based). According to the model, it was also proposed that fundamental values had an effect on personal norm directly and indirectly through ecological worldviews. Among fundamental values, while biospheric value and altruistic value have direct and indirect effect on personal norm through ecological worldviews (human based and nature based) positively, while egoistic value has negative direct and indirect effect on personal norm through ecological worldviews (human based and nature based) on personal norm. Lastly, it was proposed that while nature based views has positive direct effect on personal norm, while human based views has negative direct effect on personal norm.

1.2.Purpose and Research Questions

In this study, it was aimed that a conceptual model is tested to explain how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity related to personal norm. In addition, in the current study, investigating middle school students' pre-service science teachers' and science teachers' ecological worldviews, fundamental values, personal norms and self-identities was aimed. In the scope of the study, there are three research questions.

1. In what ways are ecological worldview, fundamental values, and self identity related to personal norm?
 - a. In what ways are ecological worldview, fundamental values, and self-identity related to personal norm for middle school students?
 - b. In what ways are ecological worldview, fundamental values, and self-identity related to personal norm for pre-service science teachers?
 - c. In what ways are ecological worldview, fundamental values, and self-identity related to personal norm for science teachers?
2. What are the middle school students' pre-service science teachers' and science teachers' ecological worldview beliefs, fundamental values, personal norms and self-identities?
3. How well are ecological worldview, fundamental values, self-identity and personal norm scales adapted and validated for Turkish middle-school students, pre-service science teachers and science teachers?

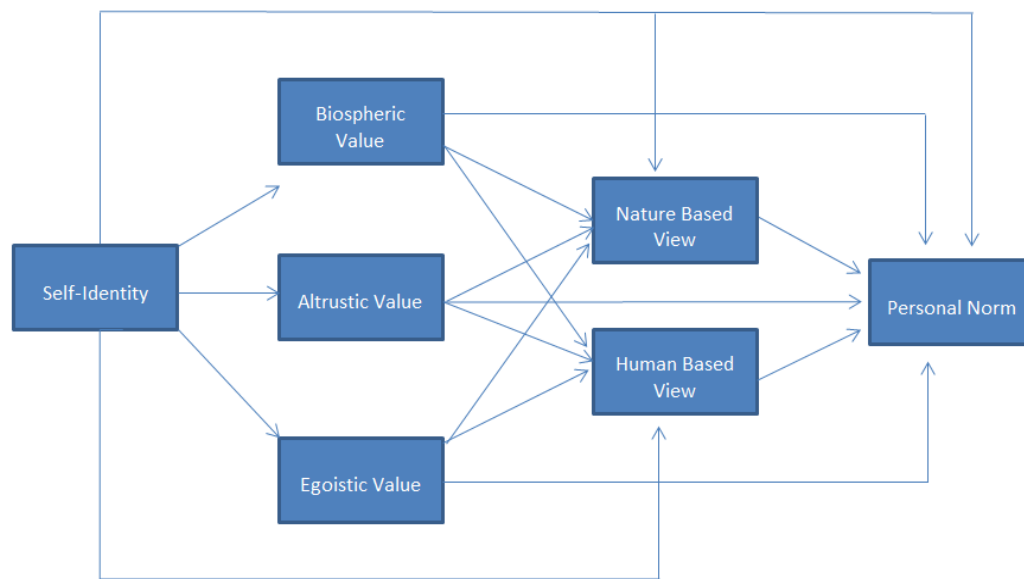


Figure 2. Proposed Model Explaining How Ecological Worldviews (Human Based and Nature Based), Fundamental Values (Egoistic, Biospheric and Altruistic) and Self-Identity related to Personal Norm

1.3. Significance of the Study

The current study is significant in that it presents some needs by its contribution and implications to related literature theoretically and practically with results including various sample group and proposed conceptual model providing reliable and valid instruments in Turkish context. This study is also significant for middle school curriculum and science teacher education program. In this section, situations and gap in the literature and significances of the study were presented in detail.

In the literature, a number of studies explaining how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self identity influence personal norm (e.g. Steg et al. 2005; Stern, 2000; Stern et al. 1999). However, these studies generally were conducted in diverse population groups such as homeowners (Fornara Pattitoni, Mura & Strazzera, 2016), people ranging in age from 19 to 81 years (Steg et al., 2005), college students (Liu, Zou & Wu, 2018) and parents of 7-9 years old pupils (Nordfjærn & Zavareh, 2017). In the present study, different to previous studies, there are three study groups including middle school students, pre-service science teachers and science teacher. While the number of studies conducted in the context pre-service science teachers was restricted (e.g., Şahin, 2013, 2016; Yıldırım & Semiz, 2019), to the best of our knowledge, there was no study which tested the conceptual model how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity are related to personal norm for middle school students and science teachers. The current study can be seen as a first attempt to explain how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity are related to personal norm for three sample groups.

The present study is important for science teacher education program. Failure of teacher education is considered as an important factor that leads to failure in the curriculum (UNESCO, 1997). Especially, if there are deficiencies about

environmental subjects in the science teacher education programs, it can't be expected that pre-service science teachers have enough awareness toward environment. Accordingly, explaining how ecological worldviews, fundamental values and self-identity are related to personal norm may develop the content of science teacher education program. Even though rising number of theories, models and studies attempted to show the relationship between the variables related to environmental subjects, it is clear that there is a gap between the ultimate aim of students' education and practice toward this education (Volk, 1984). Therefore, policymakers and researchers in Turkey try to implement environmental issues to science education (e.g., Ministry of National Education, 2018). However, it is still believed that there are still some problems about this integration regarding qualification and amount of time (Alper, 2014; Teksöz et al., 2010; Tuncer, et al., 2005). For this reason, it is thought that the results of the present study are significant to present contribution to the development of more qualified science teacher education programs.

One more significance of the study is toward elementary school curriculum. Educating next generations occupies an important place in terms of environmental issues since environmental problems occur because of human behaviors (Stratton, Hagevik, Feldman, & Bloom, 2015). Accordingly, schools and education system have a very important role to achieve these purposes and hearten the students to be more sensitive with regard to the environmental issues (Smyth, 2006; Stevenson, 2007). In Turkey, Ministry of National Education and Ministry of Development conduct researches to gain ecological awareness. Moreover, as the existence of human beings depends mainly on the environment, the environment itself and the its interactive relation with living things should be regarded as one of the main important considerations of the education system (Salmani, Hakimzadeh & Khaleghinezhad, 2015). Thus, this study can guide elementary school curriculum by proposing suggestions how to improve the curriculum related to students' gains about environmental consciousness.

The current study is also significant for middle school students, pre-service science teachers and science teachers. Regarding middle school students, studying with young people are particularly important as they will be affected and will have to offer solutions to environmental problems resulting from our current actions (Lyons & Breakwell, 1994). During their education in elementary school, middle school students learn and develop awareness related to environmental subjects. Therefore, their internal moral obligation and responsibilities about conducting or refraining pro-environmentally behaviors have great importance. In addition, attaching importance to the biosphere or non-human all living creatures, concerning related to all living things including animals and plants, putting an emphasis on the welfare of other people in terms of environmental aspect, having nature based ecological worldviews and having high level of self-identity should be important to gain environmental consciousness for middle school students. Accordingly, investigating their ecological worldviews, fundamental values, self-identity and personal norm and relationship between these variables is important to educate middle school students to prepare future.

Considering to pre-service science teachers, they were stated as the one of the main subjects of the current study since they are accepted as among important parts of an influential environmental education (Plevyak, Bendixen-Noe, Henderson, Roth & Wilke, 2001). Pre-service science teachers who value nature for its own sake and thus, judge that nature is deserving of protection due to its intrinsic value, attach importance to the biosphere or non-human all living creatures, are worried with regards to all living things and put an emphasis on the welfare of other people in terms of environmental aspect are hoped to overcome ecological problems in various ways in their courses, and use and develop their own teaching methods and materials, make their students indigenise positive values, norms and responsible self-identities related to environment (Alper, 2014). Hence, since pre-service teachers are acknowledged as the key elements for environmental education (Loughland, Reid, & Petocz, 2002), determining factors influencing their personal norms is important.

Regarding science teachers, as an individual, science teachers are effective due to interaction between them and nature in the future (Gardner & Stern, 2002). Accordingly, measuring science teachers' ecological worldviews, fundamental values self-identity and personal norm has a great importance. Science teachers should have a high awareness of the environment, so we can say that teachers can present important solutions so as to handle environmental threats. If this situation can be provided, it can be possible to carve out a better future and to raise individuals with environmental awareness (UNESCO, 1987). In addition, teachers can be a role model for students to improve their interests and beliefs toward environmental issues (Dhawan & Joshi, 2011; Khalid, 2001; Teksöz, Şahin & Ertepinar, 2010) which can be considered as an important element in the the 21st century (UNCED, 1992) and develop students' scientific literacy, and to know how to live in harmony with their environment (Orr, 1992). Additionally, teachers can encourage students at schools in every level of them to act responsibly towards the environment that constitutes the main objectives of science education including, skills, values and awareness (Tucker, Kiser, Sivek & Daudi, 2002). However, even though importance of these aims was emphasized, according to some researchers who conducted with middle school students (e.g., Alp, Ertapınar, Tekkaya & Yılmaz, 2008), students are not enough qualification about environmental awareness. Therefore, studying with science teachers has great importance to be useful for students' future, society and science education literature.

With the study, the validity and reliability of the instruments was provided in Turkish context and factor structure of instruments by using explanatory factor analysis and confirmatory factor analysis were presented. In addition, the current study aimed to expand these descriptive characteristics by proposing a model which was estimated by structural equation modeling (SEM). Based on the current results, the scales appear to provide a valid and reliable measure of exploring how well NEP, fundamental values, and self-identity are related to personal norm. In this manner, this research can be important for the related

literature by providing reliable and valid instruments and outcomes measuring the effect of NEP, fundamental values, and self-identity on personal norms in Turkish context.

1.4. Definition of Important Terms

Pre-Service Science Teachers: Undergraduates who are educated in the four year elementary science education department to be middle school science teachers will teach science to students from the 5th to the 8th grade.

Science Teachers: Science teachers in public schools or private schools in Turkey teach science courses to students from 5th grade to 8th grade.

Personal Norm: Personal norm can be defined as internal moral obligations of the individuals and the responsibility of the individual to act or avoid pro-environmentally behaviors (Garling et al., 2003).

New Ecological Paradigm (NEP): NEP is a “*measure of endorsement of a pro-ecological worldview and it is used extensively in environmental education explained by underlying a world view, or a paradigm*” (Anderson, 2012, p.260).

Fundamental Value: Fundamental value influence beliefs related to consequences of attitude objects for the things a person values and therefore have consequences for that individual’s behaviors and attitudes (Stern & Dietz, 1994).

Egoistic Value: Individuals who have egoistic value attach importance to own interests and desires in terms of using natural resources (Stern & Dietz, 1994; Stern, Dietz & Kalof, 1993).

Biospheric Value: Biospheric value is related to biosphere or the non-human species and individuals who have Biospheric value are concerned about all living things in the nature (Schultz et al., 2005)

Altruistic Value: People with social-altruistic value put an emphasis on the welfare of other people (Stern & Dietz, 1994; Stern, Dietz & Kalof, 1993).

Self-identity: Self-identity is defined as “*a person’s perception of himself*” (Sherwood, 1965; p. 66).

CHAPTER 2

LITERATURE REVIEW

The present study aimed to assess middle school students', pre-service science teachers' and science teachers' ecological worldviews, fundamental values, personal norms and self-identities. Additionally, proposing a conceptual model how ecological worldviews, fundamental values, and self-identity are related to personal norms was aimed. This chapter provides comprehensive literature both in abroad and Turkey related to studies on new ecological paradigm (NEP), fundamental values, personal norms and self-identities. While presenting the studies, detail information including research; aim, sample characteristics, scale information, data analysis method and results of the studies were provided.

2.1.New Ecological Paradigm

Understanding environmental concern called also ecological worldview become is important and this importance has increased among researchers who are interested in how individual attitudes and beliefs inform and ultimately influence environmental decisions (Amburgey & Thoman, 2012). Efforts to understand antecedents of ecological worldview and consequences, ideas about humanity–nature relationships and what people think and mentioned about the environment become popular research topic among researchers (Bonnes & Bonaiuto, 2002; Dunlap & Emmet-Jones, 2003). Ecological worldviews are beliefs of people related to the natural world' value and their relationship to it and affects how people assess and respond to natural and human being caused hazards (Castro 2006; Dunlap et al. 2000). Past researches showed that if people have pro-environmental worldview, they are more likely to get into the act to address environmental problems (Ebreo, Hershey & Vining, 1999) while people who

have less concern about environmental problems act in less pro-environmental way (Dunlap & Van Liere, 1978; Dunlap, 2008). Given this situation, it is critical for researchers to investigate why people are interfering with the environment in such a way and an important step towards accomplishing this objective is to measure people's environmental worldviews in a valid and reliable way (Hawcroft & Milfont, 2010). In order to measure worldview, although there are several measurement tools available, researchers have used mostly three of them (Dunlap & Jones, 2003; Fransson & Garling, 1999): the Environmental Concern Scale developed by Weigel and Weigel (1978), Ecology Scale developed by Maloney, Ward, and Braucht, (1975) and the New Ecological Paradigm Scale (NEP; Dunlap & Van Liere, 1978; Dunlap, et al., 2000). In many studies all over the world, NEP scale which is the most used measurement tools of ecological worldviews is *“focused on beliefs about humanity’s ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity’s right to rule over the rest of nature”* (Dunlap et al., 2000; p.427). It can be also said that NEP is a *“measure of endorsement of a pro-ecological world view and it is used extensively in environmental education explained by underlying values, a world view, or a paradigm”* (Anderson, 2012, p 260). According to NEP, society participates in the process of changing the vision of the environment (Corral-Verdugo & Armendariz, 2000). It includes various expressions related to environmental concern such as, intentions, attitudes, beliefs and behavior, environmental concerns about various environmental issues such as natural resources and pollution and measure general beliefs related to human-environment relationship (Hawcroft & Milfont, 2010). Although NEP is the most used scale measuring these beliefs related to human-environment relationship, a total of four kinds of version of NEP scales were published because some of the items in the first version of the scale did not fully measure ecological worldviews towards beliefs. For this reason, the NEP has been changed periodically by the researchers. Historical information on the developmental stages of the NEP is given in the following section.

2.2. History of New Ecological Paradigm Scale

The NEP scale which is a survey-based metric developed by US environmental sociologist Riley Dunlap and his colleagues is designed to measure the environmental concerns of their group by using a fifteen-word research tool. The roots of it date back to old times in when US environmental movement of the 1960s and 1970s were become reality (Dunlap & Liere, 1978). Social psychologists have suggested that the worldview of the so-called dominant social paradigm is changing to reflect increasing environmental concern and the development of valid and reliable measures of environmental worldview helps scholars better understand the orbit of these changes and their relationship to demographic, economic and behavioral changes in the US population (Anderson, 2012). Therefore, a data collection tool called the New Environmental Paradigm at Washington State University was developed in 1978 to measure these changes. The idea is that this tool can determine where a population is in its transition from the dominant social paradigm to a new, more environmentally conscious worldview, a change that the developers of New Ecological Paradigm scale believed is likely to happen (Dunlap & Liere, 1978). There are several versions of NEP used from the 1970s to the present all around the world due to some requirements such as dated language, characteristics of sample, keeping up with the times, development of technology and statistical deficiencies. There are a total of four kinds of version of NEP scales which was presented for adults and children separately (The shortened 6-item NEP Scale, Original NEP scale, Revised NEP scale and NEP for Children) published until recently. Scales and items related to NEP from first version to recent version are involved in Table 1. First version of NEP was developed by Dunlap and Liere (1978) with 1441 Washington households consisting of 12 items (Eight of the items are worded such that agreement reflects acceptance of the NEP, while for the other four disagreement reflects acceptance of the NEP) with 4 point Likert type scale ("Strongly Agree," "Mildly Agree," "Mildly Disagree" and "Strongly Disagree) with three main facets of the new social paradigm or worldview: Beliefs about

humanity's ability to upset the balance of nature, The existence of limits to growth for human societies, and Humanity's right to rule over the rest of nature.

Table 1. The New Environmental Paradigm Scale (Hawcroft and Milfont, 2010; p.145; Manoli, et al., 2007; p.9).

Original NEP items (1978)	The shortened 6-item NEP Scale (1982)	Revised NEP items (2000)	NEP for Children (2007)
1. We are approaching the limit of the number of people the earth can support.	1. The balance of nature is very delicate and easily upset by human activities.	1. We are approaching the limit of the number of people the earth can support.	1. Plants and animals have as much right as people to live.
2. The balance of nature is very delicate and easily upset.	2. The earth is like a spaceship with only limited room and resources.	2. Humans have the right to modify the natural environment to suit their needs.	2. There are too many (or almost too many) people on earth.
3. Humans have the right to modify the natural environment to suit their needs.	3. Plants and animals do not exist primarily for human use.	3. When humans interfere with nature it often produces disastrous consequences.	3. People are clever enough to keep from ruining the earth.
4. Mankind was created to rule over the rest of nature.	4. Modifying the environment for human use seldom causes serious problems.	4. Human ingenuity will insure that we do NOT make the earth unlivable.	4. People must still obey the laws of nature.
5. When humans interfere with nature it often produces disastrous consequences.	5. There are no limits to growth for nations like the United States and Canada.	5. Humans are severely abusing the environment.	5. When people mess with nature it has bad results.
6. Plants and animals exist primarily to be used by humans.	6. Mankind was created to rule over the rest of nature.	"6. The earth has plenty of natural resources if we just learn how to develop them.	"6. Nature is strong enough to handle the bad effects of our modern lifestyle.
7. To maintain a healthy economy we will have to develop a "steady-state" economy where industrial growth is controlled		7. Plants and animals have as much right as humans to exist.	7. People are supposed to rule over the rest of nature.
8. Humans must live in harmony with nature in order to survive.		8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	8. People are treating nature badly.
9. The earth is like a spaceship with only limited room and resources		9. Despite our special abilities humans are still subject to the laws of nature.	9. People will someday know enough about how nature works to be able to control it.
10. Humans need not adapt to the natural environment because they can remake it to suit their needs.		10. The so-called "ecological crisis" facing humankind has been greatly exaggerated.	10. If things don't change, we will have a big disaster in the environment soon."
11. There are limits to growth beyond which our industrialized society cannot expand.		11. The earth is like a spaceship with very limited room and resources.	
12. Mankind is severely abusing the environment.		12. Humans were meant to rule over the rest of nature.	

Table 1. (continued)

	13. The balance of nature is very delicate and easily upset.
	14. Humans will eventually learn enough about how nature works to be able to control it.
	15. If things continue on their present course, we will soon experience a major ecological catastrophe.

After testing internal consistency, Dunlap and Liere (1978) was found coefficient alpha as .81 and strongly discriminated between known environmentalists and the general public. The scale was used for twenty years with general public, as well as used with samples of interest groups including farmers, environmental orientations of ethnic minorities, college students (e.g., Edgell & Nowell, 1989) in many countries such as Canada, Sweden, the Baltic countries, Spain, Turkey and Japan (Dunlap et al., 2000). However, there are some critics toward this first version because of some shortcomings such as dated language which was used in the statements of instrument, poor correlation between the scale and behavior and involving deficiency about internal consistency of given responses (Anderson, 2012). Therefore, it is needed to revise NEP scale. Dunlap developed a new short NEP scale including six items to use in a national survey for the Continental Group (1982) was used in several studies (e.g., Pierce, et al., 1992) with three facets identified in original version: “balance of nature”, “limits to growth”, and “human’s right to rule” (Dunlap et al., 2000). In the data collection of last NEP scale which is more contemporary version revised by Dunlap et al. (2000), researchers studied with 676 Washington State residents after being pretested with college students. In the study revised 15 items are involved. Among these items, the eight odd numbered ones were worded so that agreement indicates a pro-ecological view and the seven even-numbered ones so that disagreement indicates a pro-ecological worldview. The items which have five facets are explained in below (Dunlap et al., 2000):

1. The reality of limits to growth (items no: 1, 6, 11): The NEP relates to equality and issues related to development, the limits to human interaction with nature and to boundaries of population growth related to the earth's carrying capacity.
2. Anti-anthropocentrism (items no: 2, 7, 12): The idea that nature is primarily for human use is not acceptable.
3. The fragility of nature's balance (items no: 3, 8, 13): The NEP advocates the idea that there is equilibrium in nature and that human intervention has put this balance in jeopardy.
4. Rejection of exemptionalism (items no: 4, 9, 14): The NEP supposes that people deny the exemptionalism of humanity based on the world view that humans are excluded from the restrictions of nature.
5. The possibility of an eco-crisis (items no: 5, 10, 15): The NEP emphasizes human dependence on nature and the destructive consequences of human intervention in nature.

Dunlap et al. (2000), found Coefficient alpha value as .83 and removing any item in the scale decrease the value of alpha. Factor analysis of the study showed that all 15 items load heavily on the first unrotated factor, and this factor explains 31.3% of the total variance among the items. Although the three kinds of NEP scale are suitable for adults, one more scale was developed by Manoli, Johnson and Dunlap (2007) for children because most of the environmental education programs were designed for use of children. Standard Likert-type format of NEP scale consists of three dimensions with 10 items and appropriate for use with children aged 10–12 years (Manoli, et al., 2007). Prepared NEP scale for children was used in several studies (e.g., Corraliza, Collado & Bethelmy, 2013; Izadpanahi, Elkadi & Tucker, 2017; Petegem & Blicck, 2006; Wu, 2012). Published studies related to each version of NEP scales are involved in detail in literature review section.

In addition to NEP, several psychological features are attached great importance in environmental education literature. For example, in the last a few decade, a number of studies have suggested that values, personal norm and self-identity in the environmentalism study should be seen as among basic concepts (e.g., Dietz, Kalof, & Stern, 2002; Fielding, McDonald & Louis, 2008; Gatersleben, Murtagh & Abrahamse, 2014; de Groot & Steg, 2007; McCright, & Dunlap, 2015; Stern, et al., 1999; Stern, 2000; Schultz & Zelezny, 1999; Walton & Jones, 2017). In further sections, detail information about these psychological features is involved.

2.3.Fundamental Values

In environmental psychology, values which can be defined as “*a desirable transsituational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity*” (Schwartz, 1992, p. 21) have been conducted by various studies. In addition, numerous of studies corresponding with values in environmental studies are based upon Value Theory including 56 fundamental values classified (e.g., de Groot & Steg, 2007; Stern, et al., 1999; Stern, 2000). In addition, 56 fundamental values include 10 motivational types of values which have a two-dimensional space that consists of four separate value clusters including openness to change versus conservatism and self-enhancement versus self-transcendence (Schwartz, 1992). Theoretical model of relations among motivational types of values, higher order value types and bipolar value dimensions are included in Figure 3. The first value cluster is openness to change versus conservatism which separates values that emphasize independence, such as stimulation and self-direction from values that stress conformity and tradition, while the second value cluster is self-enhancement versus self-transcendence which separates self-transcendent or social values such as benevolence and universalism from those that interest in self-enhancement or personal interests, such as achievement and power (Schwartz, 1994). Each value in regions of each motivational type is given in Table 2.

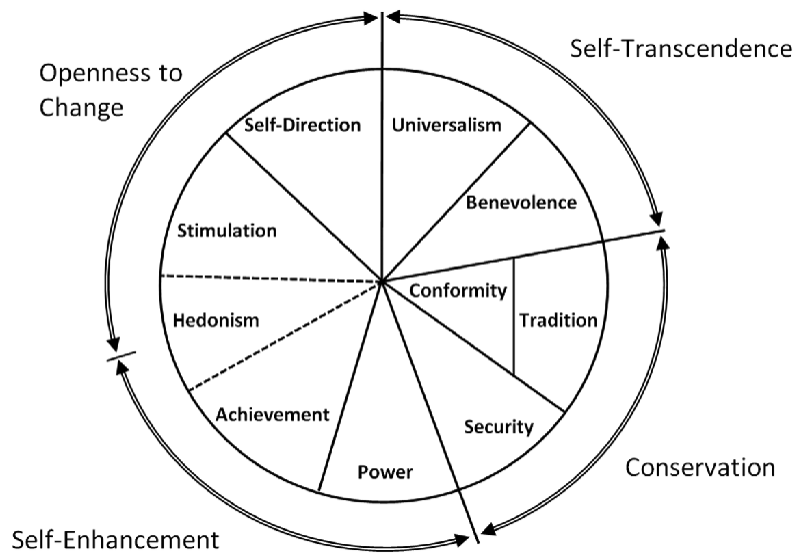


Figure 3. Theoretical model of relations among motivational types of values, higher order value types, and bipolar value dimensions (Schwartz, 1994, p.24)

Table 2. Locations of Each Value in Regions of Each Motivational Type (Schwartz, 1994, p. 33)

Power	Equality
Social power	A world at peace
Authority	Inner harmony
Wealth	Benevolence
Preserving my public image	Helpful
Social recognition	Honest
Achievement	Forgiving
Successful	Loyal
Capable	Responsible
Ambitious	True friendship
Influential	A spiritual life
Intelligent	Mature love
Self-respect	Meaning in life
Hedonism	Tradition
Pleasure	Devout
Enjoying life	Accepting portion in life
Stimulation	Humble
Daring	Moderate
A varied life	Respect for tradition
An exciting life	Detachment
Self-direction	Conformity
Creativity	Politeness
Curious	Honoring parents and elders
Freedom	Obedient
Choosing own goals	Self-discipline
Independent	Security
Universalism	Clean
Protecting the environment	National security

Table 2. (Continued)

A world of beauty	Social order
Unity with nature	Family security
Broad-minded	Reciprocation of favors
Social justice	Healthy
Wisdom	Sense of belonging

Although Schwartz (1992) presented the theoretical model of relations among motivational types of values, higher order value types and bipolar value dimensions, in further studies, some researchers decreased the number of values included in Schwartz (1992, 1994) study (Axelrod, 1994; Stern & Dietz, 1994). For example, a series of by Stern and his colleagues (Stern, 2000; Stern & Dietz, 1994; Stern, Dietz & Kalof, 1993) argued three different fundamental values: an egoistic, a social-altruistic, and a biospheric value. In the present study, it is thought that fundamental values are considered important because they are general in nature and accordingly can affect various environmental beliefs, attitudes and norms simultaneously (Rohan, 2000). Considering these fundamental values in detail, it is assumed that each value which may be relevant for understanding nature ensures that the individual is sensitive to certain outcomes (de Groot & Steg, 2007). Among fundamental values, individuals who have egoistic value attach importance to own interests and desires in terms of using natural resources. However, people with social-altruistic value put an emphasis on the welfare of other people. Biospheric value focuses on nonhuman species or the biosphere and such individuals are concerned about all living things including plants and animals (Schultz et al., 2005) and are strongly and consistently related to environmental preferences (Steg & De Groot, 2012). People who have biospheric values are concerned about environment and pay attention to all preferences for nature (Van der Werff, Steg & Keizer, 2013). The characteristics of values show also more reasons why studying with values are important in this study. One of the reasons is that because it has been reasoned theoretically and empirically validated that values play a significant role about being in association with some psychological variables such as ecological

worldview, personal norm and self-identity (e.g., Bardi & Schwartz, 2003; Stern et al., 1998; Stern et al., 1999; Stern, 2000). For example, according to Stern (2000), values are antecedent to ecological worldviews. In addition, understanding various types of values helps remarkable precedence so as to shape the human belief (Dietz Fitzgerald, & Shwom, 2005). In this explanation, it can be understood that values are obtained to apply influence on human belief toward the environment (Snelgar, 2006). Therefore, values are thought as an effective factor that can affect the general belief toward the environment (Stern et al., 1999). Considering each value type in fundamental values, if people have altruistic or biospheric values, they can have more powerful ecological worldview beliefs but, if people have egoistic value, they can have less powerful ecological worldview beliefs (Stern & Dietz, 1994). Accordingly, ecological worldview beliefs appear to be positively related to social-altruistic and or biospheric values and negatively to egoistic values. In many empirical studies, the relationship between fundamental values and ecological worldview beliefs was examined (e.g., Bardi & Schwartz, 2003; de Groot & Steg 2008; Nordlund & Garvill, 2003; Stern, et al., 1995; Stern et al., 1998; Stern et al., 1999; Stern, 2000). In one of them, by Stern, Dietz and Guagnano (1995) revealed that NEP scale was associated with egoistic value negatively ($r = -.26$), was related to biospheric ($r = .46$)-altruistic value strongly in positive way. In one more study, de Groot and Steg (2008) found that egoistic and biospheric values made a significant contribution to relationship between values and NEP. Fundamental values accounted for 27% of the variance in NEP. Egoistic value were negatively related to environmental concern ($\beta_{ego} = -.32$). Moreover, the more participants endorsed value the environment and biosphere the stronger their environmental concern ($\beta_{bio} = .47$). When the other value were controlled for, it is seen that the more participants endorsed to altruistic values, the lower their environmental concern ($\beta_{alt} = -.20$). Another reason why studying with fundamental values is important in the present study is that the number of values that people can think of is rather small (de Groot & Steg, 2007). Thus, relative to other variables (e.g.,

ecological worldview, personal norm and self-identity), fundamental values may contribute the current study for describing and accounting for differences and similarities between individuals and groups (de Groot & Steg, 2008). Accordingly in this dissertation, examining fundamental values and its relationship with other variables used in environmental psychology is expected to contribute to the study.

2.4. Self-Identity

In a definition, Sherwood (1965) defined self-identity as “*a person’s perception of himself*” (p. 66), while in another one, self-identity refers to how an individual sees himself or herself and can cover all aspects of the self such as physical characteristics, preferences, values, personal goals, habit behavior, personality traits and personal narratives (McAdams, 1995). Self-identity reflects how much he or she views them at the extent to which one meets the criteria for a particular social role (Conner & Armitage, 1998). In addition, people tend to present themselves in ways that are coherent with their self-identity (Burke & Reitzes, 1991). For example, self-identity serves to differentiate itself from the others as well as to follow the values, and beliefs of the social groups to which he/she belongs (Christensen, Rothberger, Wood & Matz, 2004). Crompton and Kasser (2009) stated that values and life goals are the viewpoints of identities of people, that reflect what they think are desirable, important and worthy of their lives. According to Verplanken and Holland (2002), values can form important components of a person's self-concept and therefore contribute to the identity of a person. In addition, Sparks and Shepherd (1992) stated that self-identity of a person is reflected in the beliefs and values of that person. Considering the literature, self-identity concept and its relationship between the psychological variables such as values and ecological worldviews is also involved in theoretical and empirical studies related to environmental psychology (e.g., Fielding et al., 2008; Hitlin, 2003; Gatersleben, Murtagh & Abrahamse, 2014; Snelgar, 2003; Steg & De Groot, 2012; Walton & Jones, 2018; Van der Werff, Steg & Keizer,

2014). For example, Stets and Biga (2003) suggested to bring the concept of identity into environmental sociology since these two concepts are related each other. Therefore, they proposed a model indicating the relationship between identity and ecological worldview indicating that once one's identity is formed, ecological worldviews will develop. In the proposed model, eleven bipolar statements comprised the self-identity instrument and the widely used and recently revised version of the NEP scale was used to measure ecological worldviews. Results of the study showed that self-identity has the strong significant effect on ecological worldviews suggesting the more the self-identity is, the more likely it is that one will hold positive ecological worldviews. In addition, some studies were also emphasized the relationship between values and self-identity in environmental aspects. Among them, Gatersleben, Murtagh and Abrahamse (2014) stated that if you define yourself as environmentally friendly, you are likely to have strong environmental values. In other words, values represent what individuals find important in their lives and therefore influence how individuals want to see themselves (namely, their ideal selves), what kind of individuals they want to be and how they see themselves and this means that values can affect one's self-identity (Van der Werff, Steg & Keizer, 2014). Those who care too much for nature and the environment are more likely to see themselves as a kind of human being who acts environmentally friendly and acts accordingly (Steg & De Groot, 2012). In addition, there are some theoretical and empirical studies in environmental psychology literature. Considering empirical studies, Hitlin (2003) examined the relationship between fundamental values and self-identity and found that among values emphasized by Schwartz (1977), self-transcend (universalism and benevolence), one of the values, is associated positively and significantly with the self-identity, while the values of self-enhancement (power and achievement) are negative predictor of self-identity indicating that students who stated greater concerns with achievement or power are less likely to show a strong self-identity. Van der Werff, Steg and Keizer (2013) aimed to determine the relationship between biospheric values and self-

identity. They obtained that biospheric values accounted for 46% of the variance of self-identity. It means that the stronger people had biospheric values, the stronger their self-identities ($\beta = .68$). Accordingly in this dissertation, exploring in more detail self-identity and its relationship between fundamental values, ecological worldviews and self-identity was aimed.

2.5. Studies on New Ecological Paradigm

Considering NEP studies, from first version to final version, it can be seen that many studies with various aims are involved in the literature and researchers have focused on environmental concern (e.g., Spash, 2006; Stern, Dietz, & Guagnano, 1995), ecological worldviews (e.g., Harraway, Broughton-Ansin, Deaker, Jowett, & Shephard, 2012; Putu, 2017; Rideout, 2005), ethnicity, country or culture differences (e.g., Fleury-Bahi, Marcouyeux, Renard & Roussiau, 2015; Vikan Camino, Biaggio, & Nordvik 2007), socio-demographic determinants of the NEP Scale (e.g., Fransson & Gärling, 1999; Zelezny, et al., 2000). The studies were conducted from different countries with various age groups (See Table 3). For example, according to a meta-analysis by Hawcroft and Milfont (2010), there are a total of 36 countries where studies were conducted related to NEP.

To our best knowledge, there were 13 more countries including Zimbabwe and Belgium (Petegem & Blieck, 2006), France (Fleury-Bahi, Marcouyeux, Renard & Roussiau, 2015), Malaysia (Karpudewan, Ismail & Roth, 2012), Italy (Carrus, Bonaiuto, & Bonnes, 2005), Senegal (Grůňová, Sané, Cincera, Kroufek & Hejcmanová, 2018), Iran (Hosseinnezhad, 2017), United Arab Emirates (AlMenhali, Khalid & Iyanna, 2018), Israel (Goldman, Assaraf & Shemesh, 2014), Vietnam, Saudi Arabia, Iraq, Egypt and Palestine (Cruz, Alshammari & Felicilda-Reynaldo; Reynaldo et al., 2018) and Taiwan (Liu & Lin, 2013). Accordingly, totally, the number of countries conducted on NEP is 49 in 8 continents. Among them, there are two countries in Africa, 10 countries in Asia, five countries in Middle East, two countries in North America, 12 countries in Latin America, 10 countries in Western Europe, six countries in Eastern Europe

and two countries in Oceania. The list of countries and world regions where NEP studies conducted is given in Table 3. In the following part, studies, presented in the Table 3 were reported. First, studies conducted with adults were mentioned.

Table 3. The List of Country and Region in which NEP Studies were Conducted

Region	Country
Africa	Zimbabwe
	Senegal
Asia	China
	Hong Kong
	India
	Indonesia
	Japan
	Maldives
	Vietnam
	Taiwan
	Malaysia
	South Korea
North America	Canada
	USA
Latin America	Argentina
	Brazil
	Colombia
	Costa Rica
	Dominican Republic
	Ecuador
	El Salvador
	Mexico
	Panama
	Paraguay
Peru	
Middle East	Venezuela
	Iraq
	Palestine
	Israel
	Saudi Arabia
	United Arab Emirates
	Egypt
Iran	
Western Europe	Germany
	Belgium
	France
	Netherlands
	Italy
	Norway
	Portugal
	Spain
Sweden	

Table 3. (Continued)

	United Kingdom
Eastern Europe	Bulgaria
	Turkey
	Czech Republic
	Estonia
	Latvia
	Russia
Oceania	New Zealand
	Australia

2.5.1. Studies Conducted to Determine Ecological Worldviews of Adults

In a study, investigating the beliefs about human-environment relation of 422 Mexican people was aimed (Corral-Verdugo & Armendariz, 2000). Of the participants 47% of them are female and 53% of them are male. In the study, a Spanish version of the 12-item NEP scale developed by Dunlap and Liere (1978) was used. The scale includes two parts: Pro-NEP (9 items) and Pro-HEP (Human Exception Paradigm) (3 items). The Pro-NEP scale includes items referring to the need for a “natural balance” and “limits to human impact on nature”. However, Pro-HEP scale is examined in terms of a view of humankind rather than control over nature. Cronbach’s Alphas of Responses to the Pro-HEP and Pro-NEP is .63 and .57, respectively. The results of this study indicated that Mexicans are highly committed to pro-ecological beliefs. In general, the pro-NEP items elicited higher acceptance than pro-HEP items implying that the people in Mexico is more committed to preserving the environment than to a utilitarian view of nature.

One of the studies conducted on NEP was carried out by Ogunbode (2013) in Nigeria. In the research, 15-item NEP scale was applied to 355 ($M_{\text{female}}=188$, $M_{\text{male}}=165$, age range 18- more than 30 years old) university students who study at University of Ibadan to determine their ecological worldviews. The factor analysis showed that there are five dimensions of NEP scale. The Cronbach alpha for the total sample was .61, while among the dimensions of NEP scale; it was found that the value is .70 for limits to growth, .70 for anti-anthropocentrism, .70 for possibility of eco-crisis, .61 for anti-exemptionalism, .64 for balance of

nature. The results of the study indicated that the mean score of NEP scale was 2.95 which mean low endorsement of the NEP. The mean value of limits to growth is 2.27, 2.37 is for anti-anthropocentrism, 3.63 is for possibility of eco-crisis, 3.14 is for anti-exemptionalism, 3.40 is for balance of nature. The results indicated that a low endorsement of the NEP among Nigerian students and ecological worldviews among the students are more closely characterized by the dominant social paradigm implying that the view that humans are superior to other all other species, the Earth provides unlimited resources for humans, and that progress is an inherent part of human history.

In a research in Israel conducted by Goldman, Assaraf and Shemesh (2014), senior and junior chemical engineering students' (N=247; 64% female, 36% male) views related to relationship between human and nature were obtained and they completed the 15-item NEP scale. The results of the study indicated that the mean score of NEP scale was 3.51 which mean a moderately ecocentric and emphasises the only slightly ecologically supportive orientation of these students. In addition, the mean value of limits to growth is 3.11, 3.58 is for anti-anthropocentrism, 3.79 is for likelihood of eco-crisis, 3.35 is for rejection of exemptionalism and 3.72 is for balance of nature. Researchers interpreted results as following; based on the NEP scores, it appears that these students have yet to consolidate their worldviews regarding the nature of relationships between humans and natural systems. The positions held by these students, as a group, for these two tenets indicate that the ideas portrayed in the NEP tool confronted them with dilemmas. Their indecisiveness is also reflected in the score for the facet anti-anthropocentrism that most directly addresses the focus of their environmental values humans or nature. These students only slightly reject the anthropocentric position that humans are above nature and the value of nature is determined by services it provides humans.

In a study conducted by Putu (2017), aim was to determine pre-service science teachers' ecological worldviews using NEP scale. There are 92 pre-service

teachers who enrolled courses related to environmental education (i.e., environmental introduction and general ecology) and attended the study from Universitas Mahasaraswati Denpasar in Indonesia with a mean age of 21.3 years ranged from 20 to 36. In the study, 69.6 % of them were female and 30.4 % of them were male. University students completed the 15-item NEP scale ($\alpha = .62$) included local ecological paradigm (LEP; $\alpha = .60$). While NEP assess the views related to human nature relationships, LEP assess which was designed to include a local perspectives of students through modified NEP scale addressing specific environmental issues related the Subak. The results of the study indicated that the total means for NEP scale and LEP scale were above 3 which mean that pre-service teachers have pro-environmental beliefs implying that participants have pro-environmental views but they were not strong. "Even though several items of the NEP scale may be less suited for testing environmental concerns, the majority of students' arguments were appropriate with most item statements." Significant and high positive correlation between many NEP and LEP items were found. This means that the high correlation between the NEP and LEP items reflect that most students may consider the broader issues of the NEP relevant to their local culture." However, on several items the global views of students was not sufficiently supported by their local context.

Liu and Lin (2015) carried out a study to investigate environmental worldviews of university students in Taiwan. There are 29 students who were selected with purposive sampling technique enrolled a science lesson. In the study university students completed the 15-item NEP scale measuring their views related to relationship between human and nature. The key findings based on their relations to science and science education were the following, Most students seemed to immediately relate the topic of nature to science and thus sought to explain nature from a scientific perspective, yet their understanding of scientific concepts or metaphors, such as the balance of nature, was problematic; a value-free perspective is evident among some students in viewing human-induced natural crises": What we should do is "merely look at facts and let science tell us what

we should and should not do.” The students generally expressed trust in science and technology. They also believed it to be the key to improving the condition of nature as well as human life. Researchers interpreted that the sample, science and non-science majors alike, believed that the natural systems remain in a state of balance, or approximate equilibrium, most of the time.” Furthermore, these students presented a variety of meanings of the balance of nature idea. “Although these meanings seemed to be ambiguous and sometimes confusing, they formed part of the students’ environmental worldviews and told us something about how they viewed nature, human–nature relationships, and science.”

The aim of Hosseinezhad’ (2017) research is to evaluate NEP scale with the people of Tabriz. There are 682 ($N_{\text{Female}}=343$, $N_{\text{male}}=339$) people over 15 years old attended the study. Considering factor analysis, there are four components occurred with eigenvalues which are greater than 1 and account for 60.53 % of the total variance. The factor analysis showed that there are four dimensions belonging to the full NEP scale. People completed the 15-item 6-point Likert-type NEP scale with five dimensions. Among them, seven items are involved in disagreement toward a pro-ecological worldview, while 8 items were involved in pro-ecological items. The Cronbach alpha for the total sample was .64. Results of the study showed that the mean score of NEP scale was 49 (ranged from 29-75) which mean that people in Tabriz in Iran perceive the environment as somewhat valuable and somewhat negligible. To be specific, the mean value of limits to growth is 11.69 (ranged from 4-22), 14.11 (ranged from 4-21) is for anti-anthropocentrism, 15 (ranged from 7-18) is for likelihood of eco-crisis, and 14.74 (ranged from 4-20) is for balance of nature. According to researchers, the results demonstrated that the average of evaluations for environmental attitude of citizens was determined as medium. This means that the citizens had a somewhat protective attitude to the environment. The citizens had some degree of anti anthropocentric attitude, in that evaluation showed that they think humans are not the only species inhabiting the earth and that plants and animals have rights to existence comparable to those of humans. This conclusion is compatible with

the principal assumptions of the NEP scale; that citizens consider the human impact on the environment and that environmental crises are possible.

The purpose of Cruz, Alshammari and Felicilda-Reynaldo' (2018) research is to examine predictors of Saudi nursing students' ecological worldviews utilizing 15-item 7-point NEP scale and effect of demographic characteristics including participants' age, gender, community type and year level on these views. There are a total of 280 (56% of them are female and 44% of them are male; $M_{age}=23.03$ years) university students who are at 2nd, 3rd and 4th grades in Hail City in Saudi Arabia. Among them, seven items are involved in disagreement toward a pro-ecological worldview, while 8 items were involved in pro-ecological items. The Cronbach alpha for the total sample was .83. Results of the study showed that the mean score of NEP scale was 62.71 implying that the total NEP mean score indicated that the students had moderate pro-environmental attitudes, but the score ranges showed poor to moderate attitudes. In addition, the overall NEP scores were subjected to a regression analysis with the demographic and environmental-related variables as predictor variables. The regression model was statistically significant. The significant predictor variables accounted for approximately 30% of the variance in the students' attitudes. The environment related variables were identified as significant predictors of students' attitudes on the environment. Specifically, students who failed to gain knowledge about environment and its impact on health in any nursing courses or were unaware of climate change exhibited poorer attitudes than students who gained knowledge about the environment and its impact on health from nursing courses and were aware of climate change. Moreover, students who attended climate change-related seminars or trainings in the past year have more positive attitudes than students who did not attend the training. Specifically, learning about the environment and related issues in the nursing department, being aware of climate change, and attending environment related seminars and trainings seem to positively influence the environmental and sustainability attitudes of nursing students.

In a quasi-experimental study conducted by Karpudewan, Ismail and Roth (2012), investigating the results of change in Malaysian pre-service science teachers' ecological worldviews was aimed. A total of 263 sophomore pre-service teachers who get a science teaching methods course participated in this study (227 females and 36 males). Revised NEP scale was used to collect data. For experimental study, students were randomly assigned to experimental group consisting of 140 students (117 females, 23 males) and control group consisting of 123 students (110 females, 13 males). The reliability analysis showed that Cronbach's Alpha value was obtained as .83. Students from the control group carried out the same activities as a traditional method, while the students in the experimental group carried out 10 green chemistry experiments/activities including generating electricity from waste, safer dry-cleaning, the need to green the waste, investigating the lifecycle of plastic, heating and cooling curve, chemical reactions global warming, production of biodiesel/petroleum diesel, neutralization of acid and base and production of carbon dioxide gas. Since the pre-test indicated that the treatment and control group were equivalent, one t-test on the post-test scores was conducted. The results showed statically significant differences in pre-service science teachers' ecological worldviews between the traditional and experimental groups with the former showing more environmentally friendly ecological worldviews than the latter. In addition, data as pre-test or pro-test obtained from the experimental groups was examined. From this analysis researchers obtained that the mean NEP score for the pre-test was $M_{pre} = 59.22$ and the post-test mean was $M_{post} = 48.31$. Considering the results of experimental groups in terms of items, the results presented an increase in the total pro-NEP stance calculated in percentage for the entire 15 items. Lastly, it was concluded that the green chemistry curriculum constitutes a suitable context: for changing the levels of self-reported pro-environmental actions and for supporting pre-service teachers in their development of pro-environmental ecological worldviews.

Another experimental study by Harraway, Broughton-Ansin, Deaker, Jowett and Shephard (2012) examined changes in students' ecological worldviews by using the NEP scale in New Zealand. There were 360 ($N_{\text{female}}=200$, $N_{\text{male}}=160$) students who are enrolled in a first year undergraduate course involved at the University of Otago in 2009. Students completed the 15-item NEP scale and a socio-demographic information scale including year of study, gender and self-reported program affiliations. There are four sub-factors of NEP scale including "reality to limits to growth", "fragility of nature balance", "anti-anthropocentrism" and "rejection of exemptionalism". The Cronbach alpha values for the items defining each of the four sub-factors are 0.64, 0.71, 0.60 and 0.51 respectively. Data were analyzed with respect to gender and discipline including Surveying, Anatomy/physics/biology and other major. For example, there is a gender effect on the study in favour of females who indicated more pro-ecological views than male counterparts both at the start ($p = .003$) and end ($p = .002$) of the course. There is a declining in the mean score between start and end time in terms of surveying major ($M_{\text{start}}=3.44$, $M_{\text{end}}=3.36$), anatomy/physics/biology ($M_{\text{start}}=3.72$, $M_{\text{end}}=3.68$) and other major ($M_{\text{start}}=3.78$, $M_{\text{end}}=3.76$). Additionally, surveying major has significantly lower mean than other majors, while zoology major has significantly higher mean than others. However, obtained other differences among major groups are not statistically significant. Researchers stated that the results from this study show that first-year university students in this cohort containing representatives of a wide range of programs have wide-ranging ecological worldviews and contributory sustainability tendencies. At this stage of their studies in higher education, surveying students hold weaker pro-ecological views while zoology students hold stronger pro-ecological views than others in the cohort. It is important to note, however, that the surveying students are largely male with the other student groups being predominantly female. In addition, gender is an important predictor of ecological worldview. On average, women hold stronger pro-ecological views

than men overall so this result must be viewed with caution as it is affected by the clear imbalance of gender in the programs making up our study.

2.5.2. Studies Conducted to Determine Young People' Ecological Worldviews

In this section, studies conducted with the purpose of determining young people' ecological worldviews and testing reliability and validity of New Ecological Paradigm scale designated for children in various countries are involved. More detail information including researchers carried out studies, aim, sample characteristics, scales information, data analysis method and results of the studies are involved below from oldest to recently studies.

After first version of NEP scale (Dunlap & Van Liere, 1978) and revised version of NEP scale (Dunlap et al. 2000), it was needed to reconstitute a new scale for children since their understanding is not enough for comprehend all the items included previous NEP scales prepared for adults. Therefore, a new version of scale was tested by Manoli, Johnson and Dunlap (2007). They reconstituted and confirmed NEP scale which was is for adults in order to use for upper elementary students. Another reason why this study was conducted is that many school programs at schools are arranged for students. Therefore, it is supposed that there is a need to develop a NEP scale for students. Application process was conducted with students who study at fourth, fifth and sixth grade through interviews step-by-step with two years. Students firstly completed the 15-item NEP scale with five dimensions. Among them, seven items are involved in disagreement toward a pro-ecological worldview, while 8 items were involved in pro-ecological items. Considering factor analysis, there are five components occurred with eigenvalues which are greater than 1 and account for 53.68% of the total variance. However, five items were removed because of students' incomprehension and low factor loads, and it was found that there are three dimensions including "Rights of Nature", "Eco-Crisis," and "Human Exemptionalism". Confirmatory factor analysis showed the data were a good fit to the model including three-factor

structure in Validation year 2 and Validation year 3. Finally, it was concluded that the final version of NEP scale is suitable for children ages 10–12 years with 15 items and three dimensions. The researchers stated that the result is highly valuable because they have not conducted comparable studies of potential changes in adult worldviews in response to educational programs. They also found it possible to treat the scale as a unidimensional measure providing one overall score on the anthropocentric (DSP, low score) to ecocentric (NEP, high score) continuum, after reverse scoring the negatively worded items of the scale.

Although a vast majority of studies are related to purpose of determining young people' ecological worldviews, some of them were also conducted to test validity and reliability of NEP scale designated for children. Among studies conducted to test validity and reliability of NEP, the aim of the Gruňova, Sane, Grůňová, Sané, Cincera, Kroufek and Hejzmanová' (2018) study is to investigate validity of NEP scale designated for children. A total of 782 ($M_{age}=13$) children who live in urban areas ($N_{girl}=229$, $N_{boy}=219$, $N_{total}=448$) and in rural areas ($N_{girl}=145$, $N_{boy}=172$, $N_{total}=317$) in November and December 2015 in seven rural schools and 12 urban schools in Dakar, Thies and Ziguinchor in Senegal involved in the study. Children completed the 10 item children NEP scale three developed by Manoli et al. (2007) in order to determine ecological worldviews in French language. Factor analysis of the study showed three sub-dimensions including Human Exceptionalism, Eco-Crisis and Rights of Nature. It was also found that three factor explains 43% of the total variance with an eigenvalue of more than 1 among the items. The reliability analysis showed that low reliability for whole scale ($\alpha=.23$) and for sub-dimensions including Human Exceptionalism ($\alpha=.28$), Eco-Crisis ($\alpha=.50$) and Rights of Nature ($\alpha=.20$). After confirmatory factor analysis, moderate level good fit for whole sample including urban and rural areas was obtained. The findings showed that according to analysis there are low internal consistency and unexpected responses due to some possible reasons such as religious beliefs, cultural features, understanding differences and low

awareness level related to people' impact on the natural world. Therefore, it was concluded that analysis was unreliable for the sample.

Among studies determining children' ecological worldviews, the purpose of Petegem and Blicek' (2006) study is to determine students ecological worldviews with NEP scale for children. There are a total of 524 ($N_{\text{boy}}=246$ and $N_{\text{girl}}=347$ and 20 unknown) students who are between 13 and 15 years old in Zimbabwe and 613 ($N_{\text{boy}}=242$ and $N_{\text{girl}}=280$) students who are 13 years old in Belgium. Students completed the 15-item NEP scale with three dimensions including "limits to growth", "humans over nature" and "balance of nature" developed by Manoli et al. (2007). The scale includes seven items assessing an anthropocentric "humans as rulers over nature" view and eight items assessing an ecological "humans as part of nature" view. Descriptive findings showed that students in Belgium showed more pro-ecological conceptions ($M=63.18$) than students in Zimbabwe ($M=51.44$). Considering dimensions, in two dimensions ($M_{\text{Limits to growth}}=3.77$, $M_{\text{Humans over nature}}=3.28$) students in Zimbabwe have more mean score than students ($M_{\text{Limits to growth}}=3.58$, $M_{\text{Humans over nature}}=2.37$) in Belgium, while in the dimension of Balance of nature, students ($M=4.10$) in Belgium have more mean score than students in Zimbabwe ($M=3.71$). These results showed that students in Belgium believe in human-nature equality, while Zimbabwean students feel more dominant over nature. Considering the results, researchers stated that this difference in NEP acceptance could be explained by distinct experiences of the natural world acquired in early childhood as these influence environmental concern, although complementary work has not been carried out to confirm this."

In Evans, Brauchle, Haq, Stecker, Wong and Shapiro' (2007) study, investigating students' ecological worldviews was aimed with reliable and valid instruments. There are a total of 100 ($N_{\text{boy}}=50$ and $N_{\text{girl}}=50$) students who study at first and second grade ($M = 6.8$ years) in public schools in small towns and rural areas in New York. Among students, 92% of them are White, 76% of their mothers graduated from college and involved in upper-middle-income families. In the

study, to improve students' ecological worldviews, three games were developed. Students completed the 15-item adult NEP scale with four dimensions including the "balance of nature", "limits to growth", "anthropocentrism", and concern about environmental catastrophe developed by Dunlap et al. (2000) in order to determine ecological worldviews. However, since students didn't understand the concept of environmental catastrophe and items were proved unreliable, evaluation was made with 11 items and three dimensions. The reliability of the NEP scale was obtained as .69. During the game, the first ecological worldview criterion consisted of a game board where the child competed against the interviewer before trying to finish the game. In the dice roll, the child moved his piece first, then the experimenter. At diversity intersections around the board, the child had to choose between the various options he preferred. The options were shown graphically on the board and read aloud to the child. Five options include watching TV on the outside against watching inside, throwing paper into a single trash, rather than separating the paper from normal trash bins, using one or both sides of the paper, riding on buses or cars, and using a leaf blower or cleaning the leaves. Unbeknownst to the child, the game is always structured to reach every decision point before starting the experiment. The experimenter then made the same choice as the child did before. The second ecological worldview assessment techniques include felt board constructions showing two alternative environmental scenarios. The child built both alternatives by placing both of them in a separate felt board, and then answered the question of which board was more closely linked to how he/she felt about the subject. Environmental dilemmas, living with animals against human sovereignty, water pollution that causes serious damage to the environment, pesticide use in the garden to kill pests, pesticide application instead of damage to the flowers occurred. In the third attitude game, a worry thermometer consisting of 'no worries', 'a little worry', 'very worry' and showing three faces was used. These faces were evenly arranged vertically from the bottom of a moving thermometer to the top. After 3 week period, Test-retest reliability was high toward NEP scale. The results of the study

indicated that students had moderately high ecological worldviews. Comparison of pre- and post-camp experiences showed that from first day to fifth day, students' views changed significantly. The results imply that children hold moderately high ecological worldviews and tend to behave in a manner that is ecologically responsible. These children can reliably report on ecological worldview. Indices of internal consistency and temporal stability were satisfactory, ecological worldview scale appears sensitive, reflecting a range from low to quite high positive ecological worldviews.

Boeve-de Pauw, Donche and Van Petegem (2011) investigated the link between children' ecological worldviews and their personalities. There are a total of 957 ($N_{\text{boy}}=371$ and $N_{\text{girl}}=567$, 21 unknown) students aged between 14 and 16 ($M_{\text{age}}=15.05$) who study at first and second grade in secondary education at four schools chosen due to attainability and willingness to cooperate offering general or technical education in Belgium. Students completed two scales. Firstly, they filled the 15-item NEP scale developed by Manoli et al. (2007) with three dimensions. The scale includes seven items assessing an anthropocentric "humans as rulers over nature" view and eight items assessing an ecological "humans as part of nature" view. Secondly, The "Hierarchical Personality Inventory for Children" (HiPIC) developed by Mervielde and De Fruyt (1999) in Dutch was used to examine Big Five personality traits in children in the study.

The scale involves 144 items, assessing 18 different facets of personality. These facets are hierarchically organized under five primary traits, which the authors label: (1) extraversion, (2) benevolence, (3) conscientiousness, (4) emotional stability and (5) imagination. In the study, four kinds of statistical analysis was used: confirmatory factor analysis (1), the reliability of each of the domains and facets of the HiPIC (2), the relationship between the students' ecological worldviews and their personality (3) and explanatory power of the Big 5 personality traits for the children' ecological worldviews on on their NEP scores (4). Researchers tested five models: Three factor model, including "Balance of Nature", "Limits to growth" and "Man over nature", two models taken from

Manoli et al. (2007), a three dimensional model including “Rights of Nature”, “Eco- Crisis” and “Human Exemptionalism” and a unidimensional model. Internal consistency of NEP scale ($\alpha=.71$) and HiPIC scale (Conscientiousness $\alpha=.88$; benevolence $\alpha=.80$; extraversion $\alpha=.79$; neuroticism $\alpha=.75$; imagination $\alpha=.85$) showed acceptable level. The correlation analysis showed that conscientiousness and benevolence show significant with the children’ ecological worldviews. Concentration, perseverance and orderliness indicated a low correlation with NEP. Finally, it was revealed that personality traits accounted for only a small part of the variety in children’ ecological worldviews (.7 %). These results showed that children who are willing to take responsibility for their behaviors and who feel in control over the outcomes of their decisions are more likely to have an eco-centric worldview.

In Wu’ (2012) study, NEP Scale developed by Dunlap et al. (2000) was used as a Chinese version with 507 students (age 10 to 12 years old) in three elementary schools in Nanshan District, Shenzhen, China. Internal consistency value is acceptable level (Cronbach’s alpha = .65). The results of the study indicated that the mean scores of most items in the current study were above 3 with a scale mean score of 3.94. In regard to item scores, item 7 (“All living beings (including humans, plants and animals) have the equal right to live on the planet”) and item 9 (“Despite having special abilities (in comparison with plants and animals), humans are still subject to (or should respect to) the law of nature”) got high scores of 4.72 and 4.70, respectively, while item 4 (“Humans are clever enough to make sure that the earth is survivable”) and item 6 (“There will be enough resources on the earth for humans as long as humans learn how to exploit these resources”) had relative low scores of 2.84 and 2.88, respectively. Further detailed examination of frequency distributions identified conflicting attitudes of students toward statements pertaining to the same facets on the scale. Most of the respondents (78.7%) strongly agreed with item 9 (anti-exemptionalism), but less than half (37.3%) doubted the statement in item 4 (anti-exemptionalism). On the other hand, about 51.2% of the respondents agreed that (“there would be enough

resources on earth if humans learned how to exploit them”) (item 6), while more than 75% of the respondents agreed that the earth had very limited space and resources (item 11; “The earth (like a spaceship) has very limited space and resources”). Around 4% of the participants stated Do not understand for item 1 (“The earth has limited resources and can only support finite population, but the present population on the earth is approaching this limit”), item 8 (“Nature has strong enough abilities to balance (or cure”) the impacts caused by the current activities of modern industrial nations), and item 10 (“The so-called humans are facing ecological crisis (or ecological catastrophe) is exaggerated to large extent”). However, this 4% of the participants included or not, did not have a noticeable effect on the overall scale scores. Researchers stated that the results showed an acceptable level of internal consistency of the scale; however factor analysis presented a disordered multidimensional structure on the scale, indicating the current modified NEP Scale may not work so well in gauging a coherent environmental worldview of children in China as it has in the United States. This result in itself may be significant as an indicator of the current state of environmental awareness among children in China. They also interpreted that although the present modified NEP Scale proved to be a reliable instrument in a loose way, statements on some items are nevertheless not pertinent to the construct the NEP was assumed to measure; in addition, the present study also indicates that the NEP scale does not measure coherent environmental beliefs in the Chinese context. These shortcomings are partially attributed to some fundamental problems of scale framing for the original revised NEP Scale on one hand, and may be partially understood as cultural differences between China and the Western nations on the other.

Boeve de Pauw and Petegem (2012) collected data from 1586 children from three different countries (Zimbabwe, Belgium and Vietnam). There are 449 students in Vietnam age ranged from 13 to 14 (230 girls and 212 boys), 524 students in Zimbabwe age ranged from 13 to 15 (280 girls and 242 boys) and 613 students in Belgium 13 years old (347 girls and 246 boys). Students completed the 15-item

children NEP scale developed by Manoli et al. (2007) (“Eight of the items are worded such that agreement reflects acceptance of the NEP, while for the other seven disagreement reflects acceptance of the NEP”). Students in Zimbabwe and Vietnam filled NEP scale in English language, while students in Belgium filled NEP scale in Dutch language. In this paper, researchers presented the “NEP-scores and the search for dimensionality of the scales, across the different populations, by means of factor analyses. Factor analysis showed that there are three dimensions: “Limits to growth” (LIM), “Balance of nature” (BAL) and “Man above nature” (MAN). The results of the study indicated that Belgian children are more in favour of the NEP worldview (mean NEP score 63.2) than the children in Vietnam (mean NEP score 58.9) and in Zimbabwe (mean NEP score 51.4), indicating that Belgian children display pro-ecological conceptions more than children from Vietnam, and that children from both countries display pro-ecological conceptions more than children in Zimbabwe. Additionally, the result of an ANOVA shows that there are significant differences between all countries for all dimensions. Post-hoc tests show that all groups differ significantly from each other for all dimensions, except Belgium and Vietnam for the LIM dimension. Considering findings, it can be concluded that there is a clear and highly significant cultural influence on the environmental worldview of children, when developed and developing countries are compared. Such differences are important for those designing and evaluating environmental education initiatives because such initiatives need to be rooted in the local specific situation both physically and attitudinally.

Corraliza, Collado and Bethelmy’ (2013) study aimed to investigate children’s ecological worldviews with Spanish version of the NEP Scale for Children in terms of socio-demographic variables. There are a total of 574 children (54.2% of them are boys and 45.8% of them are female) in Castilla La Mancha in Spain. Children completed the 11-item children NEP scale developed by Manoli et al. (2007) in order to determine ecological worldviews in Spanish language. The reliability analysis showed that Cronbach’s Alphas of Responses to NEP is .84.

The results of the study indicated that children had mostly eco-centric beliefs. There is a significant correlation between age and NEP scores indicating that children become more pro-ecological with the age implying that older children tend to have a more eco-centric worldview than their younger counterparts. This finding showed that between 6-8 years-old and 11 years-old, children gradually shift from a more anthropocentric worldview to considering human beings' impact on the environment. Additionally, place of residence had a significant effect on NEP scores. Children who live in rural areas had higher mean NEP scores than children who live in urban areas implying that children from rural areas are more pro-ecological than those from urban areas. These results should be interpreted with caution because the effect size was relatively small. That is likely due to the fact that in general, regardless of place of residence, participants report being pro-ecological and the differences between groups of children were subtle.

Putrawan' (2015) research aimed at obtaining information related to instrument development of Students' NEP based on their knowledge about ecosystem and Locus of Control. Study was conducted with two stages. In first stage, there are a total of 362 children who live in Makassar (n = 120), Jakarta (n = 125) and Palembang (n = 117) which selected randomly in 2013 and second application was carried out with 722 children in 2014 in same cities. Students completed the 15-item NEP scale with four dimensions. The scale includes seven items assessing an anthropocentric "humans as rulers over nature" view and eight items assessing an ecological "humans as part of nature" view. LOC (17 items) developed by Rotter (1978) and Knowledge (17 items) developed by Bloom (1971) were also used in the study. Data analyzed with Factor analysis (CFA), alpha Cronbach and correlational analysis. Results of the study showed that there is no significant difference between mean scores of students in 2013 and 2014. Reliability analysis showed high degree in 2013 ($\alpha=.91$) and 2014 ($\alpha=.91$). Considering factor analysis, after explanatory factor analysis, it was found that there are two factors with eigenvalues of more than 1 in 2013, while there is a

factor with eigenvalues of more than 1 in 2013. The total amount of variance in the original data explains 50.1% and 49.34% of the total variance in 2013 and 2014 respectively. According to correlation analysis, it was obtained that knowledge ($r=.28$) and Locus of Control ($r=.44$) are significantly related to NEP in 2013, while knowledge variable ($r = .25$) is related to NEP when Locus of Control is controlled. Data were collected from four kinds of Conventional schools ($N=143$) and three kinds of Sustainable schools ($N=132$). Based on research findings, researchers stated that it could be concluded that, firstly, NEP could only be explained by knowledge about ecosystem, therefore some statements could reflect students' knowledge about ecosystem as indicators that they have a framework of thought in terms of environmental paradigm. Secondly, empirically, it has been proven that students' NEP could be measured by factors that seem to be high in dimensionality as indicated by factors which have higher factor loadings without rotation, in terms of principal component analysis with only one component for all factors due to a bigger sample size.

Izadpanahi, Elkadi and Tucker' (2017) study proposed to state whether the ecological worldviews of elementary school children can be predicted by whether their schools are designed for sustainability. A total of 275 children (ages 10–12) who study at conventional schools versus schools designed for sustainability at 4th, 5th and 6th grade in primary schools in Victoria in Australia. Students completed the 10-item NEP scale with three dimensions including ESD at School, Eco-Rights and Human Exemptionalism developed by Manoli et al. (2007). The results of the study indicated that Teachers' ecological worldviews, Parents' ecological worldviews and Sustainable School Design had an effect on Children's ecological worldviews towards the first dimension- 'Human Intervention' and this model was explained with 24%. Teachers' ecological worldviews made the strongest unique contribution to explaining children's ecological worldviews toward 'human intervention' ($\beta = .44$), school design ($\beta = .13$) and parents' ecological worldviews ($\beta = 11.9$) made less of a unique contribution to the model than Teachers' ecological worldviews. According to Semi-partial correlation,

parents' ecological worldviews, school design, teachers' ecological worldviews contributed %1.10, 1.60 and 18.92 to the total R^2 respectively. Additionally, Children's ecological worldviews toward ESD at School was explained by Teachers' ecological worldviews (contributing significantly with 6.10%), Parents' ecological worldviews and sustainable school design (contributing significantly with 20.70%) with 34.20%. Children's ecological worldviews toward Eco-Rights was explained by Teachers' ecological worldviews (contributing significantly with 2%), Parents' ecological worldviews and Sustainable School Design, with 3.50%. According to researchers, the results imply that teachers' ecological worldviews most powerfully predict the same dimension. This could be because the items in the Human Intervention dimension address the type of environmental knowledge that is usually transmitted by teachers. This result suggests that the best way to improve children's ecological worldviews towards human environmental intervention is to improve Teachers' ecological worldviews. In addition, the results of this study suggest that sustainable design at schools can significantly influence children's ecological worldviews towards and within the school environment. In other words, School Design is more potent in influencing children's ecological worldviews to the tangible sustainability features of the built environment, rather than their views to the more conceptual dimensions of Eco-rights and Human Intervention.

2.5.3. Studies Investigating Effect of Socio-Demographic Variables on New Ecological Paradigm

This section involves studies conducted with the purpose of investigating effect of socio-demographic variables on New Ecological Paradigm in various countries for both adult and child sample. In a study of Hawcroft and Milfont (2010) who conduct a meta-analysis, reporting more information about demographic characteristics and examining relationship between demographic characteristics such as gender, age, educational level, income and NEP are suggested to provide a robust body of information for next studies. Similarly, Pienaar et al., (2013) and

Pienaar et al., (2015) who used NEP found ecological worldviews of people are influenced by socio-demographic variables and advised to use these variables for future studies. Liere and Dunlap (1980) also proposed five hypotheses affecting NEP: Age hypothesis, the social-class hypothesis, the residence hypothesis, the political-ideology hypothesis and the gender hypothesis. Socio-demographic variables suggested in NEP studies for next researches are shown in Table 4.

Table 4. Suggested Socio-Demographic Variables in NEP Studies

Variables	Results of the Studies	Source
Gender	While some studies obtained females have higher ecological worldview beliefs than males, some of them obtained no significance difference since females' active role in the workforce besides their caregiver role in the household. Additionally, there is almost no study obtained that males have higher ecological worldview beliefs than females.	Hawcroft & Milfont (2010); Liere & Dunlap (1980); Pienaar et al., (2013); Pienaar et al., (2015); Zelezny, Chua & Aldrich (2000)
Age	Some studies results showed that when age is increased, ecological worldviews beliefs also increase since their experiences with nature along with their knowledge about environmental issues also increase. However, some of them found no difference.	Hawcroft & Milfont (2010); Liere & Dunlap (1980); Pienaar et al., (2013); Pienaar et al., (2015)
Income and Education Level	While some researchers found that people who have high-income and education level have fewer consensuses that the environment is fragile, people who have higher levels of education have also high pro-ecological views which is consistent with previous studies.	Cottrell' (2003); Hawcroft & Milfont (2010) Liere and Dunlap (1980); Pienaar et al. (2013); Pienaar et al., (2015)
Residential Area	Many of the research findings showed that people who live in urban residents are assumed to be more environmentally concerned than people who live rural residents. Possible reason for this this result can be explained as urban residents are more exposed to environmental problems such as air pollution.	Berenguer et al. (2005); Fransson & Garling (1999); Liere & Dunlap (1980); Lutz, Simpson-Housley & de Man, (1999)

Considering these variables, one of them is gender. Many of the theories were utilized so as to clarify gender differences in environmentalism (Zelezny, Chua & Aldrich, 2000). One of the most preferred approaches is based on socialization

and gender roles on it (Howard & Hollander, 1997; Wilkinson & Kitzinger, 1996). Socialization theory alleges that behaviour is predicted by the socialization process, by way of people are formed by gender expectations within the scope of the cultural norms context (Zelezny, et al., 2000). Women are socialized to have a more impressive, stronger ethical moral and more dependable, collaborative, nurturing, compassionate and caregiving tasks (Eagly, 1987; Gilligan, 1982). In addition to this, males are socialized to be more competitive and independent (Gilligan, 1982; Keller, 1985). In the second theory called structural theory, the distinctions between males and females in economic or professional contexts have a direct influence on their environmental point of views. The theory asserts that despite of having knowledge and acceptance on the purpose of economic growth, females are exposed to economic growth' results more than males. The source of this argument is females' active role in the labour force, as well as their role in households. This role is formed in the opposite way to the concept of head of the family who has been accepted for men since time immemorial (Weaver, 2002). Considering research findings, even though gender is believed to be important variable to emphasize, there are some studies obtained opposite results. For example, according to Liere and Dunlap (1980), there is no agreement in terms of relationship between gender and environmental concern, while in a study conducted by Zelezny, Chua and Aldrich (2000), researchers investigated studies which examined gender differences in environmentalism using NEP scale reviewing six studies (i.e., Arcury, 1990). Among these studies, four of them obtained significance difference in favour of gender (Arcury, 1990), while significance difference was found in two studies (Arcury & Christianson, 1993; Widegren, 1988). However, there is no study found that males had more environmental concern than females. In some studies it was stated that even if women have less knowledge than males, they show more concern about environmental events (Fliegenschnee & Schelakovsky, 1998; Lehmann, 1999). One big problem about gender variable in studies is that about one third of researches don't give information about socio-demographic characteristics of

sample including gender in NEP studies and, accordingly, reporting more information about gender and examining relationship between NEP scores and the gender were strongly suggested (Hawcroft & Milfont, 2010). Consequently, it is thought that examining effect of gender variable on people' ecological worldviews in the present study group contributes considerably. Considering age difference, incompatible findings examined difference age and ecological worldview beliefs were obtained. Some of them stated that according to Dunlap et al. (1980), younger people have more ecological worldview beliefs older ones. However, some of them found direct relationship between experience and ecological worldview beliefs (e.g., Lyons & Breakwell, 1994; Jianguang, 1993). When these studies are examined, while Riechard and Peterson (1998) obtained no difference, Jianguang (1993) found direct proportion between age and ecological concern. He explained probable cause as that since older people have more experience in terms of social and life, they may have more concern related to environmental issues. Similarly, Alp, Ertepinar and Tekkaya (2006) stated that since students grow, their knowledge and experience about environmental issues increase as well. Study results showed that level of education and income has important effect on individuals' ecological worldviews. According to some studies, level of education and income are positively associated with environmental concern. Results of Cottrell' (2003) and Pienaar et al.' (2013) study supported this results. However, contrary to previous findings, while Pienaar et al. (2015) found that high-income people have fewer consensuses that the environment is fragile, people who have higher levels of education have also high pro-ecological views which is consistent with previous studies (e.g., Gooch, 1995; Grendstad, 1999; Hawcroft & Milfont, 2010; Jones & Dunlap, 1992). In studies, one more demographic characteristic thought to influence individuals' ecological worldviews is residential area. Research findings showed that people who live in urban residents are assumed to be more environmentally concerned than people who live rural residents (Liere & Dunlap, 1980). Fransson and Garling (1999) explained possible reason for this this result as urban residents

are more exposed to environmental problems such as air pollution. This result was also supported by some studies (e.g., Berenguer et al., 2005; Lutz, Simpson-Housley & de Man, 1999). For example, Berenguer et al. (2005) found that people living in the rural district present more attitudes of environmental responsibility than people living in suburban district. In the present studies, some of students, pre-service science teachers and science teachers live in urban areas, while some of them in rural areas. Consequently, it is believed that examining this variable can contribute to the study.

2.5.4. Studies on New Ecological Paradigm in Turkish Context

When literature related to Turkish Versions of NEP scale is reviewed, as in the whole world, it seems that the NEP scale as a measurement of ecological worldview has been used in research in Turkey for many years (e.g., Almiaçık & Koç, 2009; Atav, Altunoğlu & Sönmez, 2015; Aydos & Yağcı, 2015; Erkal, Kılıç and Şahin, 2012; Günden & Miran; 2008; Güven, 2014; Sam, Sam & Öngen, 2010; Taşkın, 2009). Additionally, adaptation of Turkish version of the revised NEP scale (e.g., Cevher-Kalburan, 2009; Erdoğan, 2009; Furman, 1998) and Turkish version of the NEP scale designated for children (e.g., Şahin, Sariçam & Ağız, 2015) was carried out by different researchers at several times. In this section, studies conducted with the purpose of determining ecological worldviews and testing reliability and validity of NEP scale designated for adults and children in Turkey are involved. More detail information including researchers carried out studies, aim, sample characteristics, scales information, data analysis method and results of the studies are involved below from oldest to recently studies.

The first version of NEP developed by Dunlap and Liere (1978) was tested by Furman (1998) in terms of Turkish adaptation. In his study, there are total of 430 people (203 women, 227 men) who live in İstanbul in Turkey with the age of 18-24 years old, 25-34 years old, 35-44 years old and over 45 years old. The results of the study indicated that in the scale there are 12 items including three dimensions: “Balance of nature” (4 items), “limits to growth” (4 items) and

“humans over nature” (4 items) from strongly agree (5) to strongly disagree (1). A reliability of NEP scale is $\alpha=.61$ for 12 items, while reliability for “Balance of nature” is $\alpha=.55$, reliability for “limits to growth” is $\alpha=.55$ and reliability for “humans over nature” is $\alpha=.58$. These results imply that the results of the Istanbul survey added to the evidence that public concern about the environment is not limited to advanced industrialized countries but that it also is present in a developing country such as Turkey. In the study, the highest support was observed for the items that pertained to the Balance of Nature subscale followed by the items from the Limits to Growth and the Humans over Nature subscales. Considering bivariate relationship among dimensions, it was found that there is a small correlation between dimensions. Researchers stated that the results of the study also showed that the relationship between NEP and demographic parameters including age and education level was not significant and didn't support previous studies or hypothesis (e.g., Liere & Dunlap, 1980). For example, younger or more educated people didn't tend to have positive ecological worldviews (e.g., Jones & Dunlap, 1992; Van Liere & Dunlap, 1980).

Erdoğan (2009) assessed the NEP in terms of reliability and dimensionality. In the study, there are 1295 undergraduates from four universities in Turkey. The undergraduates consist of 37.6% of them at 1st year, 32.3% of them at 2nd year, 16.8% of them at 3rd year and 13.4% of them at 4th year. The revised version of NEP (Dunlap et al., 2000) including 15 items was used as data collection tool. The results of the study indicated that the reliability of the study was found as .53. Namely, there is a rather low reliability coefficient and NEP scale has low consistency in Turkish case. The total amount of variance in the original data explains 44.79% of the total variance. In the study it was obtained that there are five dimensions including “Limits to growth”, “Anti-exemptionalism”, “Fragility of nature's balance”, “Anti-anthropocentrism” and “Possibility of eco-crisis”. The study results show that majority of students hold pro-NEP views. However, about one fourth of students have pro-DSP oriented ideas in varying degree. Furthermore, one of five students can not decide on environmental issues.

Therefore, these results showed that there is no widespread adoption of the NEP orientation by students. Students approve some statements of the NEP scale while disapproving other parts of it. For some, the different constituent parts seem unrelated. Moreover, there are some items that respondents probably can not relate to without hesitation. For instance, the item 11 uses spaceship with very limited room and resources metaphor. Moreover, some people may agree with limited room idea, but disagree with limited resources. It seems that this usage confused respondents and prevented a stronger support for the item 11, because 23.2% of students were unsure and 22.8% disagreed, while only 18.2% strongly agreed. Results from the study also suggest that the set of 15 NEP items should be taken cautiously as an internally consistent measuring device in, at least, different socio-cultural environments, because alpha test is low and all 15 items have weak item-total correlations. Furthermore, low inter item correlations and low factorial loadings indicate that the NEP scale in measuring the attitudes/worldviews on wide range of ecological/environmental issues might have construct and/or predictive validity problems.

In Cevher-Kalburan' (2009) study, validity and reliability of Turkish version of NEP scale was tested with 51 people in Ankara in Turkey during 2008-2009 academic year fall semester. In the research, empirical design, pretest-posttest and control group model are used. Before and after the environmental education program, NEP Scale is used to determine the environmental worldviews of participants who are in the experiment and control group. In the study, it is stated that 28% of the participants were between the ages of 26-29, 36% of them were between 30-34 years old, 24% of them were between 35-39 years old, 12% of them were 40 years of age and over. When the factor analysis results, which are related to the New Ecological Paradigm Scale, are examined; one main factor defines 34.32% (eigen-value is 4.46) of total variance. Test-retest reliability analysis shows .94. Moreover, item total correlations which belong to the New Ecological Paradigm Scale alter between .32 and .63. In the analysis of internal consistency reliability is found as .81. The findings which are obtained from the

analysis of two split-half test reliability, which is done for confidence, show that the test's first half reliability co-efficient is .70; the second half's coefficient is .63, Spearman Brown correlation coefficient, which is between two half, is .73 and Guttman Split-Half reliability coefficient is .72. These results showed that both half of the test measure the same feature. After the Environmental Education Program, between the scores which are taken from the Children's Environmental Attitudes Scale by children who are in the experiment and control group and from the New Ecological Paradigm Scale by parents, there is deep difference for the benefit of experiment group.

In a study conducted by Taşkın (2009), determining Turkish students' ecological worldviews was aimed. There are 912 (57.8% are male and 42.2% are female) students from different types of schools, geographic regions and neighborhoods (suburban, urban, rural, and shantytown) in Turkey. Children completed the 12 item children NEP scale three developed by Dunlap and Van Liere (1978) in order to determine ecological worldviews in Turkish language. ANOVA and t-tests were used as a data analysis method. Factor analysis of the study showed also three sub-dimensions including 'limits of growth and balance of nature' 'human exemptionalism paradigm' and 'steady-state economy'. Reliability study showed that Cronbach alpha was 0.46 for the whole NEP scale; while alpha value changes from 0.59 to 0.41 for sub-dimensions of NEP scale. Results of the study showed that the average mean score of NEP is between 2.02 to 4.89 ($SD= 1.48$). Additionally, significant difference was obtained between school types and the NEP scores in favor of public school students, between fathers' education levels and the NEP scores in favor of College and graduate education level and between gender and the NEP scores in favor of female). However, there is no significant effect on the NEP scores in terms of Political view ($p=.09$), Educational level of mothers ($p=.07$), Mother's profession ($p=.12$), Father's profession ($p=.096$) and household income levels ($p=.23$). According to present research results, senior vocational high school students have the lowest scores on both tests. In other words, their environmental attitudes are more negative than those of others

(senior public normal high school students and senior private high school students). There can be two probable conclusions. First, students are usually given same-sex education, which might result in a less pro-environmental attitude. Second, according to the recent survey results, the educational quality of the students has drastically decreased.

In Alniaçık, and Koç' (2009) study, evaluating university students' ecological worldviews towards environment by using the new environmental paradigm scale was aimed. A total of 1254 students who study at five institutions including Balıkesir University, Gebze Institute of Technology, Kocaeli University, Sakarya University and Uludağ University were determined with a convenience sampling method. 60% of the respondents were female, while 40% of them is male. It was also stated that 66.1% of them study at associate degree program and 31.9% of them is undergraduate. 47.3% of them live in the city center, 43.2% of them live in the town center and 4.2% of them live in the towns or villages. Considering parents' education level, 49% of them are primary school, 29.3% of them are high school and 18.7% are undergraduate degree. The ages of the respondents ranged from 17 to 54 and the average was 20.9. Distribution of respondents by higher education institutions; 38.8% of them study at Balıkesir University , 9% of them study at Gebze High Institute of Technology, 14% of them study at Kocaeli University, 14% of them study at Sakarya University, 15.6% of them study at Uludag University. In the study revised NEP scale including 15 items was used. The results of the study indicated that after explanatory factor analysis, it was found total variance accounted for 43.33%, while the factor of 'Ecological Hazard' accounted for 13.2% of total variance, 'Technological superiority' accounted for 10.7% of total variance, 'Power of Nature' accounted for 10.1% of total variance and 'Human Supremacy' accounted for 9.4% of total variance. Additionally, a nature based worldview was found to be more common among students. However, the averages of statements against the nature-based view are generally lower. However, the view that the scientific and technological superiority of human beings have overcome the environmental problems received

above average scores. When the answers given to the statements defending the human-centered views are coded reversely, it is seen that the overall average is 3.52 points. In this study, which aims to determine the ecological worldviews of university students towards the environment by using the new environmental paradigm scale, a nature-based understanding was more common among respondents. The researchers stated that the results of the research point to issues that may be important for regional development. A significant environmental sensitivity in the young population is an important factor that businesses should consider when doing business.

In a study conducted by Sam, Sam and Öngen (2010), it was examined whether the students' ecological worldviews differ according to gender, class level and whether environment course is taken or not. Among the first, second, third and fourth year students in Bursa in Turkey, 398 people were selected voluntarily and NEP scale and some socio-demographic questions was applied to them. Of the sample, 24.6% of the students are first year students, 25.9% of them are second grade students, 24.9% of them are third grade students and 24.6% of them are fourth grade students. 37.2% of the students were male and 62.8% of them were female. The mean age of the students was 21.4. Scale questions consist of two sub-question groups, which measure environmental centered approaches and the questions that measure human centered approaches. In this study, Cronbach Alpha reliability coefficient for whole NEP scale is $\alpha=.53$. The Cronbach Alpha value for the environmental centered approaches was $\alpha=.55$, while the Cronbach Alpha value for the human centered approaches was $\alpha=.59$. The results of the study indicated that the average of the items measuring the ecological-centered situations is higher than human-centered situations. The higher values obtained from the NEP indicate that environmental awareness increases in items measuring ecological-centered situations and that environmental awareness is not fully formed in the items measuring human-centered situations. Considering results in terms of gender, female students' the mean scores toward environmental centered views are higher than male students. However, there is no significantly

difference in terms of class level and whether environment course is taken or not. The results imply that it was seen that the students have higher average in the questions that measure the environment-centric approach in the New Ecological Paradigm Scale. The high level can be evaluated as a change from the human centric approach to the environmental centric approach due to the increase in students' environmental awareness. It was found that there was a positive and significant relationship between the students' self-esteem and environmental centric approaches. This can be interpreted by researchers as the fact that students' approaches to the environment should change themselves and that they should exist in a direct dependency relationship with the rest of the nature and they start to think about being a part of a larger self-concept.

The main purpose of Altunoğlu (2010) study was to determine secondary school students' level of risk perceptions which caused by environmental problems and students' approaches to environment. In addition, it was aimed to determine whether a relationship exists between environmental risk perception and demographic characteristic of sample, approaches to environment and schools' characteristics regarding to environmental education. To achieve this goal has been adapted environmental risk perception scale ($\alpha=.89$), environmental risk size scale ($\alpha=.92$), probability of environmental harm scale ($\alpha=.94$), extent of environmental harm scale ($\alpha=.93$). For determining of approaches to environment used NEP scale. Also it was developed a scale to obtain information about demographic characteristics of sample and environmental educations characteristics of schools. Study was conducted with 682 secondary school students from 16 different cities, who were selected randomly from 7 geographical region of Turkey. As a result of factor analysis, it was determined that 4 factors for NEP scale with eigenvalues higher than 1 were formed and the structure explained 51% of the variance. However, considering the fact that the majority of the items were collected in the first factor and the Cronbach- α value was 0.71, the New Ecological Paradigm scale could be considered one-dimensional. The results of the study indicated that environmental risk

perceptions level of secondary school student were high and their approaches to environment were tended to be anthropocentric. From results of students' risk assessments were observed the outstanding of environmental problems such as global warming, radiation, areas of hazardous waste and persistent and toxic compounds. It was observed that gender is common difference source for environmental risk perception and approaches to environment. Girls perceive environmental problems more risky than boys and were more eco-centric compared to boys. However, there is no significant correlation between environmental risk perception of secondary school student and their school characteristics regarding to environmental education. According to these results, it can be said that the students who participated in the study accepted that the world's carrying capacity was difficult in terms of population growth, but they made evaluations in conformity with the dominant human paradigm rather than the assessment of the new ecological paradigm regarding the limitation of natural resources and economic growth.

Erkal, Kılıç and Şahin' (2012) study was planned and conducted so as to determine the ecological worldviews of university students. The sample of the study consisted of 213 students (60.6% were female, and 43.7% were male) from 3rd (56.3%) and 4th (43.7%) grade studying at Gazi University aged between 21 and 22. In this context, students who study at the Department of Business Education, which has not taken a course in environmental education at the university and students who study at the Department of Family and Consumer Sciences were involved in the study. Five-point Likert-type ratings were used for the 15 items in the NEP scale. Cronbach's Alpha value was calculated as .75 for the scale consisting of 15 items. Students' approaches to the environment are generally positive over medium level, and the most positive view is that "Plants and animals have as much right as humans to exist" ($M=4.59$) and "When humans interfere with nature it often produces disastrous consequences" ($M=4.11$). However, the lowest mean score belongs to an item "The balance of nature is strong enough to cope with the impacts of modern industrial nations"

($M=2.80$). On the other hand, the t-test and ANOVA results showed that there is a significant difference between students who did/did not receive environmental education at the university, 3rd and 4th grade, graduate of parents, household income. Regarding the results of the study, researchers stated that it can be stated that socioeconomic development has an important role in the formation and growth of environmental awareness. Furthermore, in order for students to gain a more positive attitude and behavior toward the environment, beginning environmental education in primary school will increase the sensitivity toward the environment and thus contribute toward the creation of a habitable environment that will increase the wellbeing of society. Furthermore, to keep the environmental issue on the agenda, it is important to ensure the continuation of academic studies being carried concerning the preservation of the natural environment, which will both contribute to the literature and attract the attention of related organizations such as public and civil society institutions and the private sector.

In a study conducted by Şahin, et al. (2015), Turkish version of NEP scale developed by Manoli et al. (2007) and designated for children and pre-psychometric findings were examined. The sample of the study consists of 263 (141 female, 122 male) students who attend 4th and 5th grade. 198 students study at 5th Grade and 65 of them are at 4th Grade. The ages of children vary between 9 and 12 years and mean age was 10.18. The items were released while the explanatory factor analysis was performed and the scale was found to be 10 items. As a result of the analysis, 50.21% of the total variance which is suitable for original scale was obtained. 1th, 4th and 7th items belonging to 1st factor accounted for 16% of the total variance, 2nd, 5th, 8th and 10th items belonging to 2nd factor accounted for 23% of the total variance and items belonging to 3rd factor Explains 11% of the total variance. Item factor loads are between .45 and .73. According to these findings, it was concluded that the item factor structure of the scale was suitable for Turkish culture but that the items should be confirmed. Therefore, confirmatory factor analysis was performed. The results of the

confirmatory factor analysis applied to the data obtained from 515 children for the construct validity of the scale by the researchers showed that the fit index values of the 3 dimensions model were acceptable. As a result, it was seen that gifted children and normal children were differentiated from each other. As a result of criterion validity study, it was concluded that the scale was valid. When the reliability studies of the NEP Scale for Children were examined, it was seen that the correlation coefficients obtained by Cronbach alpha internal consistency and test-retest method were acceptable. Researchers also stated that the New Ecological Paradigm Scale for Children is thought to provide information about children's ecological awareness levels or environmental values, as well as to facilitate environmental and nature education practices; In addition, the absence of such a scale when the literature [education, social sciences (geography), science (biology)] on the subject in our country aroused the idea that literature would be enriched with this study.

Atav, Altunoğlu and Sönmez (2015) carried out a study in order to determine secondary school students' ecological worldviews and examine the factor structure of NEP scale. A total of 1003 (55% are male, 45% are female; $M_{age}=16$) students in vocational high school and an Anatolian high school during 2013-14 academic year were attended the study. Students completed the 15 item children NEP scale with five sub-dimensions including “limits to growth”, “anti-anthropocentrism”, “possibility of eco-crisis”, “anti-exemptionalism” and “balance of nature” in order to determine ecological worldviews in Turkish language. (Eight of the items are worded such that agreement reflects acceptance of the NEP, while for the other seven disagreement reflects acceptance of the NEP called as DSP). Factor analysis was performed to the scale used in the study, and it was detected for one factor structure that eigenvalue of the scale was between 3.30 and 1.08 and gathered under four factors explaining 54% of total variance. Additionally, for two factor structures (NEP and DSP), eigenvalue of the scale was between 3.30 and 2.72 and gathered under three factors explaining 40% of total variance. After factor analysis, since two items (items 6 and 11)

were lower than expected, they were removed from the scale. Reliability study showed that Cronbach alpha was 0.75 for the two-dimension structure of the (NEP and DSP scale), while alpha level is .60 for one-dimension structure of the scale. Considering mean scores in terms of whole scale and sub-dimensions, it was found that students' means for the whole NEP scale is 3.38. The averages of the mean score in sub-dimension of Anti-exemptionalism varied between 2.77 and 3.40, the highest mean score is for available for the item "plants and animals have as much right as humans to exist" (M= 4.11) in in sub-dimension of Anti-anthropocentrism. The highest percentage (68% of the students are agreed) belongs to item of "the earth has plenty of natural resources if we just learn how to develop them" in sub-dimension of Limits to growth. 67% of the people agreed with the item 3 stating, "When humans interfere with nature, it often produces disastrous consequences" in sub-dimension of "balance of nature". Finally, it was stated that 44% of the people strongly agreed with the item stating, "If things continue on their present course, we will soon experience a major ecological catastrophe" in sub-dimension of Eco-crisis. This results imply that it was determined that more than half of the students agreed with the items in favor of the new ecological paradigm. Especially the average scores related to the items included in the dimension of the NEP determined through factor analysis demonstrated that the students agreed with such items in favor of nature. On the other hand, the items in favor of the dominant social paradigm were neither accepted nor rejected by the students. In other words, there was indecisiveness about the dominant social paradigm among the students.

In Aydos and Yağcı' (2015) study, pre-service teachers' ecological concerns were investigated with descriptive method using revised NEP scale in Faculty of Education at Hacettepe University in Turkey. Children completed the 15 item children NEP scale three developed in order to determine ecological worldviews in Turkish language. Among them, seven items are involved in pro-DSP items, while 8 items were involved in pro-NEP items. The reliability analysis showed acceptable Cronbach alpha level ($\alpha = .68$). During data collection, 1th and 3rd

grade students who studied in the department of science education were selected in the study. There are total 282 people (84 % female and 16 % male) with two grade level. According to distribution of the region they live when they were children, 73% of them used to live in city during their childhood, 14.5% of them used to in village and 12.4% of them used to live in town. Considering their statements, while 41.5% of pre-service teachers said that they attended “Environment Education” course, while 58.5% of them said that they did not attend any course related to environment. The results of the study indicated that there is a significant difference ($p < 0.05$) between eco-centric views and anthropocentric views. The mean score for eco-centric views of students who study at the Department of Science is 33.69, at the Department of Mathematics Education is 31.63 and at the Department of Classroom Education is 33.93, while the mean score for anthropocentric views of students who study at the Department of Science is 21.48, at the Department of Mathematics Education is 21.94 and at the Department of Classroom Education is 21.95. There is a significant difference in terms of grade level and anthropocentric views ($M_{1st}=22.35$, $M_{3rd}=21.09$) and eco-centric views between 1st grade students ($M=32.81$) and 3rd grade students ($M=33.77$). However, no significance difference was obtained in terms of region pre-service teachers live. Results indicated that average of the scale item shows us that eco-centric view is higher between the sample groups in the research. Researchers also stated that this education can be added to the curriculum from early childhood to high school in a formal way. Environment Education course should be taken part in every level of education parallel with the development of students.

2.6. Studies on Relationship Among NEP, Fundamental Values, Personal Norms and Self-Identity

In the second research questions of this study, it was asked that in what ways there is a relationship among middle school students’ pre-service science teachers’ and science teachers’ ecological worldview, fundamental values,

personal norm and self-identity. Therefore, a conceptual model was proposed including these variables. In previous sections, studies related to these variables are separately presented. In this section, studies which are conducted to study relationship among them. Considering literature, there are some kinds of studies included. Some of them focus on investigating relationship between two or more variables independently (e.g., de Groot & Steg, 2007; Hinds & Sparks, 2008; Van der Werff, Steg, & Keizer, 2013), in some studies researchers conducted to investigate relationship using mediator variables (e.g., Chua, Quoquab, Mohammad, & Basiruddin, 2016) or using behavioral theories or models such as value belief norm theory (e.g., Stern, 2000; Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Abel, Guagnano & Kalof, 1999) and theory of planned behavior (e.g., Fielding et al., 2008). In this section, studies conducted in various countries to investigate relationship among variables at conceptual model are involved. More detail information including researchers; aim, sample characteristics, scale information, data analysis method and results of the studies are involved in this section. For this purpose, comprehensive studies selected from abroad and Turkey were presented below. Firstly, studies investigating with the purpose of relationship among variables were provided separately. Then, studies using behavioral theories or models were included. Lastly, studies in Turkish context were provided.

According to Stern (2000), values are antecedent to worldviews. If people have altruistic or biospheric values, they can have more powerful ecological worldview beliefs but, if people have egoistic value, they can have less powerful ecological worldview beliefs. Accordingly, ecological worldview beliefs appear to be positively related to social-altruistic and/or biospheric values and negatively to egoistic values (Stern & Dietz, 1994; Stern et al., 1999; Stern, 2000). Considering the literature, there are many studies examined the relationship between fundamental values and ecological worldview beliefs (NEP) (e.g., Bardi & Schwartz, 2003; de Groot & Steg 2008; Stern, et al., 1995; Stern et al., 1999; Stern, 2000).

One of the first studies examined relationship between fundamental values and NEP was conducted by Stern, et al. (1995). Effect of age and gender on these variables was also examined in this study conducted with computer assisted telephone in Fairfax County in Virginia which is a part of the Washington, D.C. in 1993. Respondents completed the 7-item NEP scale. Cronbach alpha level (α) was obtained as .78. In addition, 14-item fundamental value scale of Schwartz (1992) and identified by Stern et al. (1993) including 10 items from biospheric-altruistic value and 4 items from egoistic value using 7-point Likert-type scales from “opposed to the judgment that the value is” to “is extremely important as a guiding principle” was used. The reliability coefficient value is .89 for biospheric-altruistic value and .74 for egoistic value. The factor analysis of fundamental values indicated that 89% of variance was explained by two factors (biospheric-altruistic value (1) and egoistic value (2). Results of the study indicated that NEP scale was related to egoistic value negatively ($r = -.26$), was related to biospheric ($r = .46$)-altruistic value strongly in positive way. However, the effect of gender and age on fundamental values and NEP is not significant. In the study, it was implied that the NEP is highly correlated with a measure of beliefs about the consequences of environmental problems generally, and the two measures behave quite similarly in a causal model that related general environmental beliefs both to specific attitudes and behaviors they may influence and to forces of social structure and socialization that may shape those beliefs.

Then, studies are continued to conduct. de Groot and Steg (2008) conducted their study to reveal whether there is a difference among biospheric value, altruistic value and egoistic value, to see relationships between values and environmental concern (NEP) and to provide construct validity of the fundamental values. The study was carried out with in three steps. In the first study, there were 112 participants ($N_{\text{female}}=58$, $N_{\text{male}}=52$) and age ranged from 19 to 81 ($M_{\text{age}}=39.82$) in Groningen city in The Netherlands. Firstly, 12-item fundamental value scale (4 items are included in egoistic value, 4 items are included in altruistic value, and 4 items are included in biospheric value developed by Stern et al. (1999) using 9-

point Likert-type scales was used. Secondly, respondents completed the 15-item NEP scale. Cronbach alpha level (α) is .73 for NEP scale, .65 for the egoistic value, .72 for the altruistic and .83 for the biospheric value. Results of the first study indicated that there is a significant and quite strong relationship between altruistic and biospheric values. However, multiple group method analysis which is a simple and effective type of confirmatory factor analysis indicated that these values were clearly distinguished from each other. In addition, there is a significant difference between the altruistic and egoistic values and between the biospheric and egoistic values. One more results obtained in the study is that Egoistic and biospheric values made a significant contribution to model (relationship between values and NEP) and fundamental values accounted for 27% of the variance in NEP. Egoistic value was negatively related to environmental concern. Moreover, the more participants endorsed value the environment and biosphere the stronger their environmental concern. When the other values were controlled for, it is seen that the more participants endorsed to altruistic values, the lower their environmental concern. Yet, no significant bivariate correlational between altruistic values and NEP was found. In the second study, 490 participants were involved (93 were Austrian, 106 were Czech, 71 were Italian, 151 were Dutch, and 69 were Swedish) in 2004 and the beginning of 2005. Same fundamental value scales were used in the study. According to results of second study, there was a positive correlation between altruistic and biospheric values. However, correlations between the biospheric and egoistic value and the altruistic and egoistic value were not significant. As in study 1, multiple group method analysis indicated that biospheric value, altruistic value and egoistic value are clearly distinguished each other. The Cronbach's alpha was obtained as .74 for the egoistic value, .73 for altruistic value and .86 for biospheric value. In the third study, a total of 184 people in University of Groningen involved in the study in February 2005. Same scales (fundamental values and NEP) were used. The results of the third study indicated that Cronbach alpha of NEP scale was .76. As in Study 1 and 2, biospheric value was strongly

correlated to the altruistic value. Egoistic value was significantly and negatively correlated to the altruistic value, while it was not correlated significantly to the biospheric value. Cronbach alpha values are .83 for the egoistic value, .83 for Biospheric value and .74 for the altruistic value. The fundamental values accounted for 30% of the variance in NEP. The most correlated value with NEP is biospheric value, egoistic value contributed significantly to the NEP in an opposite direction. However, the altruistic value didn't significantly contribute to this model. The results of the three studies support the reliability and validity of the value instrument that distinguishes egoistic, altruistic, and biospheric value. The three studies replicated the distinction into three values despite the fact that quite different samples were used. In each study, the multiple group method clearly supported the distinction between three values. Although altruistic and biospheric values were correlated, altruistic values correlated most strongly with the altruistic value scale, and biospheric values with the biospheric value scale, as expected. The internal reliability of the three value scales was sufficient to good, especially after the inclusion of an extra egoistic item in Study 2 and 3. Explained variances for all values were high as well. Furthermore, in general, the values were related to beliefs and intentions in the expected way. Study 3 gave some initial support for the claim that altruistic and biospheric values provide a distinct basis for different environmental beliefs and behavioral intentions. More specifically, altruistic and biospheric values both may be related to beliefs and intentions when altruistic and biospheric goals conflict. This instrument could therefore be useful when studying relationships between values, general and specific beliefs, intentions, and ESB. Until now, most value studies have failed to show this theoretically founded three-way classification of values.

In addition to NEP, some studies were also conducted to relationship between fundamental values and self-identity. Researchers emphasized the importance of this relationship in many times. For example, Crompton and Kasser (2009) stated that values and life goals are the viewpoints of identities of people, *that* reflect what they think are desirable, important and worthy of their lives. According to

Verplanken and Holland (2002), values can form important components of a person's self-concept and therefore contribute to the identity of a person. In addition, Sparks and Shepherd (1992) indicate that self-identity of a person is reflected in the beliefs, values and attitudes of that person. In the early of 1990s and 2000s, it was stated that although values were seen as central to the person; they rarely were linked systematically with the self (e.g., Baumeister 1986; Erickson 1995; Rohan 2000; Smith 1991; Terry, Hogg, & White 1999; Verplanken & Holland 2002). However, recently, the number of studies investigating the relationship between values and self-identity have increased (e.g., Gatersleben, Murtagh & Abrahamse, 2014; Fielding et al., 2008; Hitlin, 2003; Snelgar, 2003; Walton & Jones, 2018; Van der Werff, Steg & Keizer, 2011, 2013, 2014).

In one of the first studies examining the relationship between values and self-identity, Hitlin (2003) argue that values are unifying force within individuals' identities and aimed to measure how self-enhancement and self-transcendence values affect the adoption of the self-identity. The study was conducted before students enrolled at college and after they completed first year at a large mid-western university. Application was carried out by using Internet survey. There are a total of 314 students, among them 108 are involved in "before college" and 184 are involved after they completed first year of college. It was also indicated that the number of females are two times of males. Firstly, although there were 10 values developed by Schwartz (1992), after factor analysis, these ten values are divided to two factors: First factor includes self-enhancement (achievement and power) and self-transcendence (universalism and benevolence), while second factor includes conservation (conformity, tradition, and security) and openness to change (hedonism, stimulation, self-direction). However, then, researcher used seven values including spirituality, power, benevolence, achievement, openness to change, conservation and universalism using 9-point Likert-type scales. However, secondly, a self-identity scale was used. There are three items in the scale including "Volunteering is an important part of who I am", "I would feel a

loss if I were forced to give up volunteer work” and “Doing volunteer work is something I rarely think about”. The reliability of self-identity scale was found as .82 for first year. According to results of the study, even data weren’t obtained perfectly; they allowed researchers to indicate address the process of linking values and identities. Self-transcend (universalism and benevolence), one of the values, is associated positively and significantly ($p < .05$) with the self-identity, while the values of self-enhancement (power and achievement) are negative predictor of self-identity indicating that students who stated greater concerns with achievement or power are less likely to show a strong self-identity. One more finding obtained in this study is that gender is not a significant predictor of self-identity.

Van der Werff, Steg and Keizer (2013) investigated to determine the relationship between biospheric values and self-identity. The study was completed with three stages. In the first study, there were 468 participants ($N_{\text{female}}=229$, $N_{\text{male}}=233$) and age ranged from 18 to 89 ($M_{\text{age}}=52.46$) in Netherlands. Among them, 18% didn’t get any education or graduated from primary education or vocational secondary school, 38% of them had education from the highest level of vocational education or secondary school and 45% graduated from university. Respondents completed two scales. Firstly, 4-item biospheric value scale developed by Steg, Perlaviciute, Van der Werff, and Lurvink, (2012) was used. Secondly, Energy-Saving Self-Identity Scale including 3-items developed by Fielding et al., (2008) and Terry, Hogg, and White (1999) was used in order to measure environmental self-identities. Reliability analysis showed that while Cronbach alpha level (α) is .87 for biospheric value scale, while the value was obtained .82 for self-identity scale. In the second study, study was conducted with 138 (64% male and 36% female) respondents who are member of the panel of thesistools.com in Netherlands via online instrument ($M_{\text{age}}=55$). As an instrument, same biospheric value scale was used and Cronbach’s alpha was calculated .87. However, when researchers used self-identity scale (Cronbach’s alpha= .86), they preferred general environmental issue instead of saving energy including following three

items: “I see myself as an environmentally-friendly person”, “I am the type of person who acts environmentally-friendly” and “Acting environmentally-friendly is an important part of who I am”. In the third study, a total of 99 [16 % male and 84% female] people in a Dutch university involved in the study. During the application of scale, two different times were determined. Firstly, biospheric values scale which is same in Study 1 and 2 was filled and a few months later, students filled the self-identity scale which is same in Study 2. Cronbach’s alpha was .82 and .88 for the biospheric values scale and self-identity scale respectively. Results of the first study showed that biospheric values accounted for 25% of the variance of energy saving self-identity. It means that the stronger people in Netherlands had biospheric values, the stronger their energy-saving self-identity. In the results of second study, biospheric values accounted for 46% of the variance of environmental self-identity. It means that the stronger people in member of the panel of thesistools.com in Netherlands had biospheric values, the stronger their environmental self-identity ($\beta = .68, p < .001$). Lastly, results of third study indicated that biospheric values accounted for 23% of the variance in environmental self-identity at a later time. The more strongly university students in Dutch universities endorsed biospheric values, the stronger their environmental self-identity ($\beta = .48, p < .001$). As a result, researchers stated that they found support for this hypothesis in all three studies: the more strongly one endorsed biospheric values, the more strongly one sees himself or herself as a person who acts pro-environmentally. This was not only true for environmental self-identity but also for energy-saving self-identity. In line with their prediction, in Study 3, they found that biospheric values even predicted environmental self-identity and environmental actions at a later moment in time, suggesting that biospheric values are indeed the stable factor related to environmental self-identity. Hence, in all studies they found that although biospheric values and environmental self-identity could be distinguished empirically, there is a strong relationship between them.

In another study conducted by Van der Werff, Steg and Keizer (2014), investigating whether environmental self-identity is influenced by biospheric values was aimed. The study was conducted in several stages. In the first study, there were 232 participants ($N_{\text{female}}=88$, $N_{\text{male}}=144$) in North of the Netherlands in 2010 and 2011. Firstly, 4-item biospheric value scale developed by Steg et al. (2012) using 9-point Likert-type scales was used. Then, Environmental Self-Identity Scale including 3-items (“I see myself as an environmentally-friendly person”, “I am the type of person who acts environmentally-friendly” and “Acting environmentally- friendly is an important part of who I am”) developed by Fielding et al., (2008) and Terry, Hogg, and White, (1999) was used in order to measure environmental self-identities. Reliability analysis showed that while Cronbach alpha level (α) is .86 for biospheric value scale, while the Cronbach alpha level was obtained .95 for environmental self-identity scale. In the second study, researchers didn't only remind people of their past environmental activities, but also provided feedback on whether they were environmentally friendly. So they provided feedback to them that we associate their past behavior with their self-identity. Data were collected via two online scales after people were invited to participate in the study via email. The second study was conducted with 50 (56% male and 44% female) respondents whose ages are ranged from 18 to 65. Same value scale and environmental self-identity scale as in Study 1 were used. Reliability analysis showed that while Cronbach alpha level (α) is .92 for biospheric value scale, and .92 for environmental self-identity scale. In the third study, testing whether only reminding university students of past environmental actions affects environmental self-identity. Second, after manipulation of past behaviors, researchers aimed to replicate whether the biospheric values still affect the environmental self-identity. A total of 150 [52 of them are male and 98 of them are female] students who enrolled in exchange for course credits in a Dutch university involved in the study. Same value scale and environmental self-identity scale as in Study 1 and Study 2 were used. Reliability analysis showed that while Cronbach alpha level (α) is .89 for biospheric value

scale, and .92 for environmental self-identity scale. Considering the results, in the first study it was obtained that biospheric values significantly predicted environmental self-identity. Namely, the stronger participants engaged biospheric values the stronger their environmental self-identity. In the second study, it was obtained that participants who received feedback that participants who received feedback that they are an environmental-friendly person reported a higher environmental self-identity than who received feedback that they are not an environmental-friendly person. In addition, it was found that the stronger participants engaged biospheric values, the stronger their environmental self-identity. According to results of third study, researchers' manipulation of the salience of past behaviors affected students' self-identity. In the regression analysis, the values and manipulations are involved, it was seen that values are still associated with environmental self-identity, indicating that the stronger participants engaged biospheric values, the stronger their environmental self-identity. As a summary, researchers found that the more people believe they behaved pro-environmentally in the past, the stronger their environmental self-identity. Researchers also found consistent support for their hypothesis that values influence one's environmental self-identity.

Although values are related to self-identity in previous studies, there are also more studies adding new variables such as NEP to this relationship (e.g., Gatersleben, Murtagh & Abrahamse, 2012; 2014; Walton & Jones, 2018). Researchers believe why NEP is related to self-identity is that an ecological worldview (NEP) represents a basic way of seeing the world while an identity represents ways of being in the world. It is assumed that "seeing the world ecologically" (Dunlap et al., 2000) often leads to taking on pro-ecological roles, and affiliating oneself with environmentalists, nature, and ecological systems (Walton & Jones, 2018).

Among them, in a study, Gatersleben, Murtagh & Abrahamse (2014) investigated the associated relationship between value, NEP, and self-identity. The study was

conducted with three steps. In the first study, a total of 266 (64% are female and 36% are male) people who live in urban (46%) and rural areas (54%) in England in 2001. Age ranged from 16 to 45. The average annual income of the participants ranged from 10,000 pounds to 100,000 pounds, with an average of around 35,000 pounds. Firstly, respondents completed the 15-item NEP scale developed by Dunlap et al. (2000). Cronbach alpha level (α) is .78 for NEP. For The Self-Identity, it was asked from participants that what extent they considered themselves to be different consumer types. Explanatory factor analysis showed that there are three factors including hedonist consumers ($\alpha=0.66$), conscious consumers ($\alpha= 0.66$) and eco-centric and a non-consumer accounting for 54% of the total variance. Results of the study showed that NEP has high scores, but not related to age, gender or income. The identity of conscious consumer is not related to age and gender. However, female have more hedonist consumer identity than males. Monthly income is associated with conscious consumer identity and hedonist consumer identity. The analysis of Simple correlations indicated that the identity of conscious consumer is positively related to NEP. In the second study, two cities were selected from North and South in England in 2009. Application was carried out with 135 people (47% female, 53% male; 36% are from North and 64% are from South). Value, NEP, and self-identity scales were used in the study. The environmental self-identity scale was developed by Sparks and Shepherd (1992) and Hinds and Sparks (2008). Items were involved in the scale such as “Being . . . is an important part of who I am”. Environmental identity indicated high reliability level (Cronbach $\alpha > 0.80$). The value scale developed by De Groot and Steg (2008) include 13 values with 9-likert types. Cronbach alpha for the 5 egoistic values (authority, wealth, power, being influential, being ambitious) was 0.71; for the 4 altruistic values (social justice, equality, peace, being helpful) was 0.75; and for the 4 biospheric values (preventing pollution, protecting the environment, respecting the earth, unity with nature), the alpha coefficient was 0.89. Values didn’t associate with age, gender or income. In addition, respondents completed the 15-item NEP scale. Cronbach

alpha level (α) is .81 for NEP. NEP didn't associate with age, gender or income. Results of the study showed that both NEP, egoistic, altruistic and biospheric values were strongly related to environmental identity. There are positive and significant correlations between egoistic and altruistic values, while no significant relationship between egoistic and biospheric values was obtained. It was also obtained that a higher income is negatively related to environmental self-identity. In addition, females are defined themselves more environmental consumer identity than males. The results showed full mediation by environmental identity of the relationship between biospheric values and 'green' behaviour, and between NEP and 'green behaviour' (study 2). In Study 1, a 'conscious consumer' identity was found to partially mediate the link between NEP and pro-environmental behaviour. Environmental identity was significantly related to intention to act pro-environmentally in all three studies and identities explained variance in specific pro-environmental behaviours alongside TPB and NAM variables. However, this did not hold for all pro-environmental behaviours measured. Moreover, although significant, identities appeared to contribute only a small amount of additional explanation.

Recently, in a similar manner, Walton and Jones (2018) developed and assessed a new Ecological Identity Scale and investigated the relationship between self-identity, fundamental values and NEP. The study was carried out with 497 respondents (70 members of environmental organizations and 427 non-members of them) in-depth 2-year. IN the study three linds of scale was used. Firstly, Ecological Identity Scale developed by researchers determined 12 items after focus group meetings, and added six items adapted from the literature (e.g., Brenner, Serpe, & Stryker, 2014). Secondly, respondents completed the 15-item NEP scale (Range 15-75). Cronbach alpha level (α) is .78 for NEP. Lastly, The value scale adapted from Schwartz's (1992) Universal Values Survey include 13 values. The scale consists of two factors: Self-Transcendence Values (α =.85; 8 items; Range 8-40) and Self-Enhancement Values (α =.72; 5 items; Range 5-20). Results of the study indicated that after using item analysis and Principal

Components Analysis for Ecological Identity Scale, 41 % was explained sufficient uni-dimensionality on the first principal component with the variance across the items. Variance explained by first principal component variance was also with 30% for NEP, 48% for Self-Transcendence Values and 48% for Self-Enhancement Values. Cronbach alpha level (α) of Ecological Identity Scale including 18 items was obtained as .91. To provide confirmatory factor analysis, structural equation model (endogenous variable is ecological identity and exogenous variables are self-transcendence values and NEP) was formed and good fit was obtained. In the model, moderately large direct effects leading from NEP and self-transcendent values to ecological self-identity, which together accounted for a good fit of the common variance in ecological self-identity. With the study, researchers developed a framework that integrates key features of two major theories of identity and then used a multi method research design that emphasized theoretical and methodological correspondence and precision to develop and assess an 18 item comprehensive measure of ecological identity. The results provide preliminary but solid evidence of the scale's reliability and validity, as well as initial support for the integral framework that grounds it and methodological design used to develop it.

Some studies added also some variables to this relationship. One them is personal norm. Considering literature, it was seen that researchers focused on the relationship between fundamental values, NEP and personal norm (e.g., de Groot & Steg, 2007; Steg, de Groot, Dreijerink, Abrahamse, & Siero, 2011). In one of these studies, de Groot and Steg (2007) aimed to investigate the relationship between fundamental values and personal norms. The study was conducted with 490 (45% were male, 55% were female) people in five European countries (N=106 for Czech Republic, N=69 for Sweden, N=71 for Italy, N=94 for Austria, and N=150 for Netherlands). Age ranged from 17 to 72. Firstly, 12-item fundamental value scale was used. The Cronbach's alpha was obtained as .74 for the egoistic value, .73 for altruistic value and .86 for biospheric value. Secondly, personal norm scale including 8 items was used ($\alpha = .83$). Cronbach's alpha's

ranged from .74 in Italy to .88 in Sweden. Some of items in the scales are as follows: “I don’t feel guilty when I use the car even though there are other feasible transport alternatives available”, “I would be a better person if I more often used other transport modes instead of the car” and “I feel personally obliged to travel in an environmentally sound way, such as by using the bike or public transport”. The results of the study indicated that there was a positive correlation between altruistic and biospheric values. However, correlations between the biospheric and egoistic value and the altruistic and egoistic value were not significant. Considering the relationship between fundamental values and personal norms, the most strongly and positively correlation of personal norm occurred with biospheric value personal norm was also positively correlated with the altruistic value and negatively correlated with the egoistic value. The three fundamental values were able to account for 21% of the variance in personal norm. In addition, it was found that the more participants endorsed value the environment and biosphere the stronger their personal norms, while the more participants endorsed to egoistic values, the lower their personal norms. Considering the country differences, fundamental values accounted for 12% to 35% of the variance in personal norms and the most successful explanation of the variance of fundamental values on personal norms was found in Czech Republic, the Netherlands and Sweden. The strongest contribution in explaining personal norm in all countries was made with biospheric value. In the Netherland and Czech Republic, the egoistic value significantly contributed to the explanation of personal norms. The results show that the internal consistencies of the scales were acceptable or good in all countries. In each country, altruistic and biospheric values were correlated. However, as expected, altruistic values correlated stronger with the altruistic value scale and biospheric values with the biospheric value scale. These findings may be expected based on Schwartz’s value theory, because the altruistic and biospheric values all belong to the self-transcendence cluster. For example, the more people emphasized the importance of egoistic values, the weaker their personal norms become to reduce car use.

In another study, similarly Steg, De Groot, Dreijerink, Abrahamse, and Siero, (2011) conducted a study to reveal the relationship between fundamental values NEP and personal norm. The study was conducted with two steps. In the first study, a total of 112 (52 are male and 58 are female) people who live in the city of Groningen, the Netherlands in 2003. Age ranged from 19 to 81 years. As a data collection tools, Firstly, 12-item fundamental value scale which is a short version of Schwartz's value scale (1992) was used. The Cronbach's alpha was obtained as .65 for the egoistic value, .72 for altruistic value and .83 for biospheric value. Altruistic and biospheric values are negatively correlated with egoistic values, while their relationship is positive. Secondly, respondents completed the 15-item NEP scale. Cronbach alpha level (α) is .73 for NEP ($M = 3.5$, $SD = 0.4$). Lastly, personal norms were used on a behavior-specific level on a scale of nine items indicating feelings of moral obligation to reduce household energy use. Cronbach alpha level (α) is .84 for Personal Norm. Results of the study 1 showed that all variables are significantly associated with personal norms. Among fundamental values, while biospheric and altruistic values were strongly and positively related to personal norms illustrating that stronger altruistic and biospheric values were associated with stronger personal norms, egoistic values were negatively but not strongly related to personal norms. Consequently, values accounted for 41% of the variance in personal norms. The NEP accounted for 13% of the variance in personal norms meaning that a higher score on the NEP was related to stronger feelings of moral obligation to reduce energy use. These results indicated that values were explained personal norm than NEP with the difference of .28% of variance. In study 2, validating the results of the first study in another sample was purposed. A total of 298 (24.5% were male, 75.5% female) university students who study in a Dutch University in Netherlands in 2005 attended the study. As an instrument, firstly fundamental value scales which are almost same as Study 1. Only difference is that one additional egoistic item was added called as "ambitious: hard-working, aspiring". Cronbach's alpha was obtained as .85 for biospheric values, .71 for altruistic, and .76 for egoistic.

Egoistic values were negatively correlated with altruistic values ($r=.13$), but, not significantly related to biospheric values ($r=-.11$). Altruistic values were significantly and positively related to biospheric values ($r=.43$). Secondly, same NEP scale was used as Study 1 and Cronbach alpha level (α) was calculated as .81. Third scale used in the study 2 is Personal Norm scale. The scale includes six items reflecting their moral obligation to act pro-environmentally ($\alpha=.83$). Example items are “I would feel guilty if I would pollute the environment” and “I feel morally obliged to act pro-environmentally”. Results of the study 2 showed that all variables are significantly associated with personal norms. Among fundamental values, while biospheric and altruistic values were strongly and positively related to personal norms illustrating that stronger altruistic and biospheric values were associated with stronger personal norms, egoistic values were negatively and albeit weakly related to personal norms. Consequently, values accounted for 28% of the variance in personal norms, while NEP accounted for 19% of the variance in personal norms meaning that a higher score on the NEP was related to stronger feelings of morally obliged to act pro-environmentally. According to researchers, these results indicated that values generally explained more variance in personal norms, policy acceptability, and intentions, although the differences were not always statistically significant. More specifically, values explained a higher proportion of the variance in general and behavior-specific personal norms than the NEP and environmental concern did. This difference was statistically significant in study 1, in which we included behavior-specific personal norms, but not in study 2, in which we included a general measure of personal norms. This suggests that behavior-specific personal norms are more strongly influenced by multiple motivations than are general personal norms. This may be explained by the fact that general personal norms are less binding that is, they do not specify which environmental behaviors one should perform. In contrast, behavior-specific personal norms clearly reflect which behavior one should engage in. In this case, people will probably be aware of the consequences of this behavior for egoistic, altruistic, and biospheric values,

and consequently, personal norms are more likely to be rooted in multiple motivations.

In one more study, Chua, Quoquab, Mohammad, and Basiruddin (2016) conducted their study to reveal the relationship between fundamental values, NEP and personal norm and examining the mediating role of NEP between fundamental values and pro-environmental personal norm in the agricultural context. Data were collected from 277 (92.4% are male, 7.6% female) paddy farmers in Malaysia. The majority of the participants' age is between 36 and 45 years and 89.2% of them are married. As a data collection tools, 12-item fundamental value scale NEP and personal norm scales were used. Researchers developed a proposed model including the mediating of NEP between fundamental values and personal norms. According to this model, fundamental values have a direct and indirect effect through NEP on personal norm. In addition, NEP has a direct effect on personal norm. The results of the study indicated that biospheric value, altruistic value and egoistic value are found to be significantly related to NEP. This relationship accounted for 61.4% the variance. In addition, NEP and altruistic value are significantly and positively related with personal norm accounting for 54.9% of the variance. Biospheric value and egoistic value didn't significantly predict to personal norm. Considering the results of mediating role of NEP, the relationship between personal norm and biospheric value and egoistic value was mediated by NEP. But, NEP didn't mediate the relationship between personal norm and altruistic value ($\beta=0.08$, t -value=1.80, $p>001$). According to the values of variance explained for indirect effect, NEP partially mediated the relationship between biospheric value and personal norm with the variance of 63%. Additionally, 95.3% of total effect of egoistic value on personal norm was explained by indirect effect of NEP. Namely, it can be stated that egoistic values are the most predictors of NEP, while altruistic value has the lowest importance on NEP. As a result, the results of this research indicated that biospheric value, altruistic value and egoistic value have shown positive relationship with NEP in the agriculture context. In addition,

the output of this study found that NEP exert positive and significant effect on personal norm.

The relationship among NEP, fundamental values, personal norms and self-identity has also examined with the Value Belief Norm Theory for years. The theory developed by Stern et al. (1999) explains many behavioral antecedents of non-activist environmentalism. This theory links three theories [NEP, Value Theory, and Norm-Activation Theory] with five variables leading to behavior through a causal chain: personal norms for pro-environmental action, fundamental values, the NEP, awareness of consequences (AC) and ascription of responsibility (AR) beliefs related to biophysical environment' general conditions (Stern, 2000). The rationale and empirical support of this chain comes from previous studies (e.g., Black, Stern, & Elworth, 1985; Stern, Dietz, & Guagno, 1995). Variables involved in the chain affect following variable and this effect may also be reversed. The first theory constituted value belief theory is norm-activation theory developed by (Schwartz (1977) clarifies prosocial behaviors which are expected to follow from personal norms (Schwartz & Howard, 1981). This model is used for predicting prosocial intentions and behaviors, such as volunteering (e.g., Schwartz & Howard, 1981), donating blood (e.g., Zuckerman & Reis, 1978), donating bone marrow (e.g., Schwartz, 1973). Besides, it is also used in the environmental context studies why people are engage in pro-environmental actions such as pro-environmental behavior (e.g., Thøgersen, 1996), energy conservation (e.g., Tyler, et al., 1982), environmental citizenship (e.g., Stern et al., 1999), willingness to reduce car use (e.g., Eriksson, Garvill, & Nordlund, 2006), willingness to pay for environmental protection (e.g., Guagnano, Dietz, & Stern, 1994) and recycling (e.g., Vining & Ebreo, 1992). Personal norms involved in this theory are antecedents of behaviors and link is provided to beliefs and values that activate them (Stern, 2000; Stern et al., 1999; Stern, Dietz, Kalof, & Guagnano, 1995). Personal norms interiorized values (Thøgersen, 1996) are referred as individual's belief about what's right to do (Fransson & Biel, 1997). One more variable is belief in the scope of this theory.

Belief variable consists of three components: Ecological worldview (NEP), awareness of consequences (AC) and ascription of responsibility (AR). Ascription of responsibility (AR) is related to feelings of responsibility about the negative consequences of persons' behaviors when not acting pro-socially. While awareness of consequences is related to awareness of someone about the negative consequences of persons' behaviors when not acting pro-socially, Stern and Dietz (1994) have considered the awareness of consequences as a belief since the results will emerge in the future. One more concept which has great importance to explain environmental beliefs and intentions is value which can be used as predictors of several variables and (Stern & Dietz, 1994). Stern, Dietz and Kalof (1993) extended Schwartz's norm-activation model to examine how fundamental values affect environmental behaviors. It is assumed that each value ensures that the individual is sensitive to certain outcomes. Egoistic individuals attach importance to own interests and desires in terms of using natural resources. The belief that it will have negative consequences on itself will trigger an egoistic environmental behavior. People with social-altruistic value put an emphasis on the welfare of other people while behaving pro-environmentally. For a person who has a strong social-altruistic value, the belief that an environmental condition has negative consequences for other people will lead to behavior in favor of the environment by activating personal norms. People with biospheric value focus on the ecosystem and biosphere (de Groot & Steg, 2007). To summarize value belief norm theory, individuals exhibit pro-environment behavior since individuals feel moral obligation in terms of displaying a behavior properly, while individuals feel responsible (AR) for the results of actions on the environment (AC). In addition, general pro-environmental beliefs support results of actions on the environment (AC) and influenced by some values.

Considering studies examining VBN theory, one of the first studies was conducted by Steg, Dreijerink and Abrahamse (2005) who investigated which factors influence the acceptability of energy policies purposed to decrease CO₂ emission by households. They collected data with 112 (N_{male}=52, N_{female}=58)

people who live different locations in Groningen in Netherlands In 2003. The instrument tools consisted of five parts. Firstly, they answered measures of scales including fundamental values including two extra biospheric values adapted from Dietz, Stern, and Guagnano, (1998). Secondly, respondents completed the 15-item NEP scale. Cronbach alpha level (α) is .73 for NEP scale ($M= 3.5$, $SD=.4$). Thirdly, participants replied what extent they agreed with 21 items including ascription of responsibility (AR) awareness of consequences (AC) and personal norm. Cronbach's alpha values were .80 for ascription of responsibility beliefs ($M_{AR}=3.4$), .75 for awareness of consequences beliefs ($M_{AC}=3.8$), and .84 for Personal Norm ($M_{PN}=3.4$). Lastly, acceptability of energy policies which evaluated 16 pricing measures proposed decrease the CO₂ emission by households. Regression analysis was performed variables in the chain with preceding variable. In the study, there are five kinds of dependent variable type [acceptability judgments (1), personal norm (2), ascription of responsibility(3), awareness of consequences (4) and NEP (5)] was determined. Results of these five different models showed that considering all the variables entered the regression analysis, 32% of the variance in acceptability judgements was accounted for, 49% of the variance in personal norm. Among the variables in the model, only personal norm significantly contributed the model. Personal norm accounted for 29% of the variance in acceptability judgments referring that if personal norm becomes stronger, the number of people who support policies aimed at reducing CO₂ emissions increase. Different from ascription of responsibility, the biospheric value significantly contributed to the model. Awareness of consequences beliefs accounted for 21% of the variance in ascription of responsibility beliefs. Fundamental values, NEP and Awareness of consequences together accounted for 29% of the variance in ascription of responsibility beliefs. Only Awareness of consequences beliefs made a significant contribution to this model. The contribution of biospheric value was not significant. NEP accounted for 28% of the variance in awareness of consequences beliefs, while the model including NEP and fundamental values accounted for

29% of the variance in the awareness of consequences beliefs. Only NEP significantly contributed to this model. Lastly, the three fundamental values accounted for 25% of the variance in NEP. Egoistic and Biospheric values significantly contributed to this model. There is a positive relationship between biospheric value and NEP, egoistic value were negatively associated with NEP. However, no significant relationship was obtained between altruistic values and NEP. The relationship between ascription of responsibility and acceptability judgements was mediated by personal norms. The regression of personal norm on ascription of responsibility was significant. The regression of acceptability judgements on ascription of responsibility was significant. Researchers stated that the study results suggest that VBN theory is successful in explaining judgments of acceptability of energy policies. As expected, all variables were significantly related to the next variable in the causal chain. Moreover, in most cases, the explanatory power of the model hardly increased when other predictor variables further up the causal chain were entered into the regression model.

Chen (2015) examined the applicability of the value belief norm theory to predict pro environmental behaviors. In his study, data were collected with self-administered questionnaire in 2011. As a sampling method, stratified sampling was chosen. Totally 2000 scales were presented, 931 were returned but only 757 scales can be used. Sample of the study was from Taiwan and their age was over 20 years old. Sample of the study consist of mainly with women (56.14%), married (65.39%) and have children (65.13%). Considering their ages, between 30-49 ages are majority of sample (42.14%) while subjects aged 60 years and over were minority (12.42%). Education level of them showed that they finished senior high school education (84.14%). In the instrument, the importance of 12 values was asked. Subjects completed AR, AC, PN (Steg et al., 2005) and NEP scale. The scales which measure four different environmental behaviors were given with five point likert scale. Scale was given including environmental activist behaviour (6 items), for non-activist behaviour in the public sphere (2 items), the private sphere (6 items), and the organizational sphere (5 items).

Results of reliability analysis of scales has acceptable level: NEP (0.77), values (0.85), AC (0.79), AR (0.79), PN (0.87) pro-environmental Behavior (0.85). Confirmatory factor analysis performed for discriminant validity and construct convergent validity showed goodness-of-fit model. These results showed that these values are suitable. The antecedent variables (PN, AR, AC, NEP, and Value) explained 31%, 72%, 67%, 72%, 63% of the variance respectively. After the structural equation model analysis, it is stated that relationship between values and a person's biospheric values is highest, while relationship between values and an egoistic biospheric values. Besides, relationship between organizational pro-environmental actions and pro-environmental behaviours is highest, while relationship between private-sphere actions and pro-environmental behaviours is lowest. The findings of this empirical study confirm that both the direct effects of the postulated causal chain of the VBN theory on pro-environmental behaviour and the mediation effects of NEP, AC, AR, and PN exist. The researcher also stated that this study confirm that this VBN theory model is robust in predicting pro-environmental behaviour and implying that PN, or the sense of moral obligation to take action, is the ultimate predictor of conservation behaviour. Such a personal norm is seen as a function of a chain of three beliefs: AR, AC, and ecological worldview (NEP), which is determined by environment-relevant values. In addition, this study verifies that each intervening variable in the causal chain of the VBN theory of pro-environmental behaviour mediates the relationship between the distal variable and the outcome variable. In the Taiwan case, NEP, AC beliefs, and AR beliefs have a partial mediating relationship between their antecedents and outcome variables in the causal chain, but PN exhibits a full mediating relationship.

2.7. Studies on Relationship Among NEP, Fundamental Values, Personal Norms and Self-Identity in Turkish Context

Studies conducted in Turkey were also intended to examine relationship among ecological worldview, fundamental values, personal norm and self-identity (e.g.,

Derviřođlu, Menzel, Soran & Bogeholz, 2009; Onur, Sahin & Tekkaya, 2012; řahin, 2013; 2016; Yıldırım & Semiz, 2019). Some of them focus on relationship among all the variables, while some of them were interested in only a few of variables. In addition, a vast majority of the studies conducted their study using behavioral theories such as Value Belief Norm Theory. These studies from Turkey are summarized in this section.

In one of them Sahin (2013) conducted a study to explain pre-service teachers' energy conservation behaviors using VBN. Sample consists of 512 students (75% male and 25% are female) in two public universities in Turkey. Study was conducted with junior (49.6%) and senior students (44.5%) with the mean age of 22.4. Scale consists of seven sections: Personal Norms, Ascription of Responsibility (AR), Awareness of Consequences (AC) (25 items; Steg et al., 2005), NEP (15 items), fundamental values (12 items, Stern, Dietz, & Guagno, 1998) and conservation behaviors (9 items with 5-point scale 5=always, 1=never by Ibtissem, 2010). Reliability analysis showed that Cronbach's alpha values of personal norm, ascription of responsibility, and awareness of consequences items was obtained as .87, .80, and .87, respectively. In addition, Cronbach's alpha values were calculated as .72 for Energy Conservation Behaviors, .73 for NEP, .75 for altruistic value, .81 for Biospheric value, and .77 for egoistic value. Regression analysis was performed variables in the chain with preceding variable. In the study, there are five kinds of dependent variable type [Energy Conservation Behaviors (1), personal norm(2), ascription of responsibility(3), awareness of consequences(4) and NEP (5)] was determined.

Results of these five different models showed that investigating the predictors of energy conservation behaviors was significantly occurred only by three significant variables including egoistic value, biospheric value, and personal norm. Among them the most predictor variable is egoistic value ($\beta = -.21$). Biospheric value and personal norms significantly and positively contributed to the causal model. Personal norm, egoistic value, and biospheric value explained

28% of the variance in energy conservation behaviors. Considering the factors explaining personal norms, it was seen that personal norms were significantly related to awareness of consequences, ascribed responsibility and biospheric value. Examining the relationship between belief variables, NEP ($\beta=.24$) and awareness of consequences predicted ascribed responsibility. Looking at the associations on the awareness of consequences, NEP, biospheric value and altruistic value made significant contributions. Lastly, only biospheric value made significant contributions on NEP. The results imply that the data gathered in this study supported the idea that these teacher candidates had a feeling of moral obligation, developed a sense of responsibility, and were aware of the consequences to human and non human living things in the context of energy conservation.

In one more study conducted in Turkey by Sahin (2016), researcher investigated differentiation in household energy consumption in terms of gender and search how female students contribute household energy consumption. Sample of the study include 986 pre-service teachers (female 74% and male 26%; $M_{age}= 21.4$) in two universities in Turkey enrolling third (48.6%) and fourth (52.4%) year of undergraduate studies. Scale consists of six constructs: Scale consists of seven sections: Personal Norms, Ascription of Responsibility (AR), Awareness of Consequences (AC) (25 items; Steg et al., 2005), NEP (15 items), fundamental values (12 items, Stern, Dietz, & Guagno, 1998) and conservation behaviors (9 items with 5-point scale 5=always, 1=never by Ibtissem, 2010) and demographic information (gender, grade level, age). As data analysis, firstly, discriminant analysis was performed to see whether predictor variables can differentiate female and male reflecting VBN theory. Secondly, LISREL was used to see interrelationships among the energy-related behaviors for female pre-service teachers. Results of the study showed that firstly it was found that there is a significantly difference in terms of gender in favor of female considering predictor variables. Namely, females are stronger feelings of personal norms, more active in household energy conservation and higher tendency to value

biospheric and altruistic than males. Secondly, a model was proposed based on the gender in the scope of Value Belief Norm Theory. Therefore, confirmatory factor analysis was performed to determine whether the model is suitable or not. This analysis showed that model of the female pre-service teachers on energy conservation is adequate to interpret the significant relationships among the latent variables. The standardized path coefficients ranged from .15 to .94. In the model, the path coefficients from Altruistic Values to Ascription of Responsibility, from Awareness of Consequences to Personal Norms indicate large effect size, from Biospheric to Altruistic Values, from Biospheric to Ascription of Responsibility, and from NEP to Awareness of Consequences indicated large effect size. The path coefficients from Awareness of Consequences to Ascription of Responsibility, from Biospheric Values to Awareness of Consequences, NEP and Energy Conservation Behaviors, from Egoistic Values to Energy Conservation Behaviors and from NEP to Ascription of Responsibility reflect medium effect sizes in the tested model. The results appear to support the claim that female teacher candidates differ from males of this occupation in energy conservation, and they are more likely act as role models for pupils in terms of reduction in household energy consumption. In this aspect, it is a plausible inference that female teacher candidates, compared to males of this occupation readily fight climate change with a reduction in energy use showing a long term effect.

CHAPTER 3

METHOD

The method section includes information related to the methodology of the present study including design of the study, context of the study, sample and population, data collection tools and development, data collection, data analysis, validity and reliability and assumption and limitation of the study.

3.1.Design of the Study

This study was conducted based on correlational research. Correlational research is involved among associational researchs and in which the associations between two or more variables are examined without any interventions affecting them (Fraenkel, Wallen & Hyun, 2012). Therefore, this study is suitable for this design because of the nature of purpose of the study, which proposes a model to explain the associations among the new ecological paradigm, fundamental values, personal norms and self-identity across three different sample groups. Path analyses are used as the modeling technique. The study is a quantitative research which bases upon on data from students', pre-service science teachers' and science teachers' self-reports. A flowchart provided in Figure 4 presents the brief informations about research design of the current study.

3.2. Context of the Study

The sample was selected from the same context which was middle schools and public universities in Kırşehir, Kayseri, Ankara and Manisa in Turkey. Considering education of middle school students, they get science courses from 5th to 8th grade each year and environmental related subjects are involved in science courses.

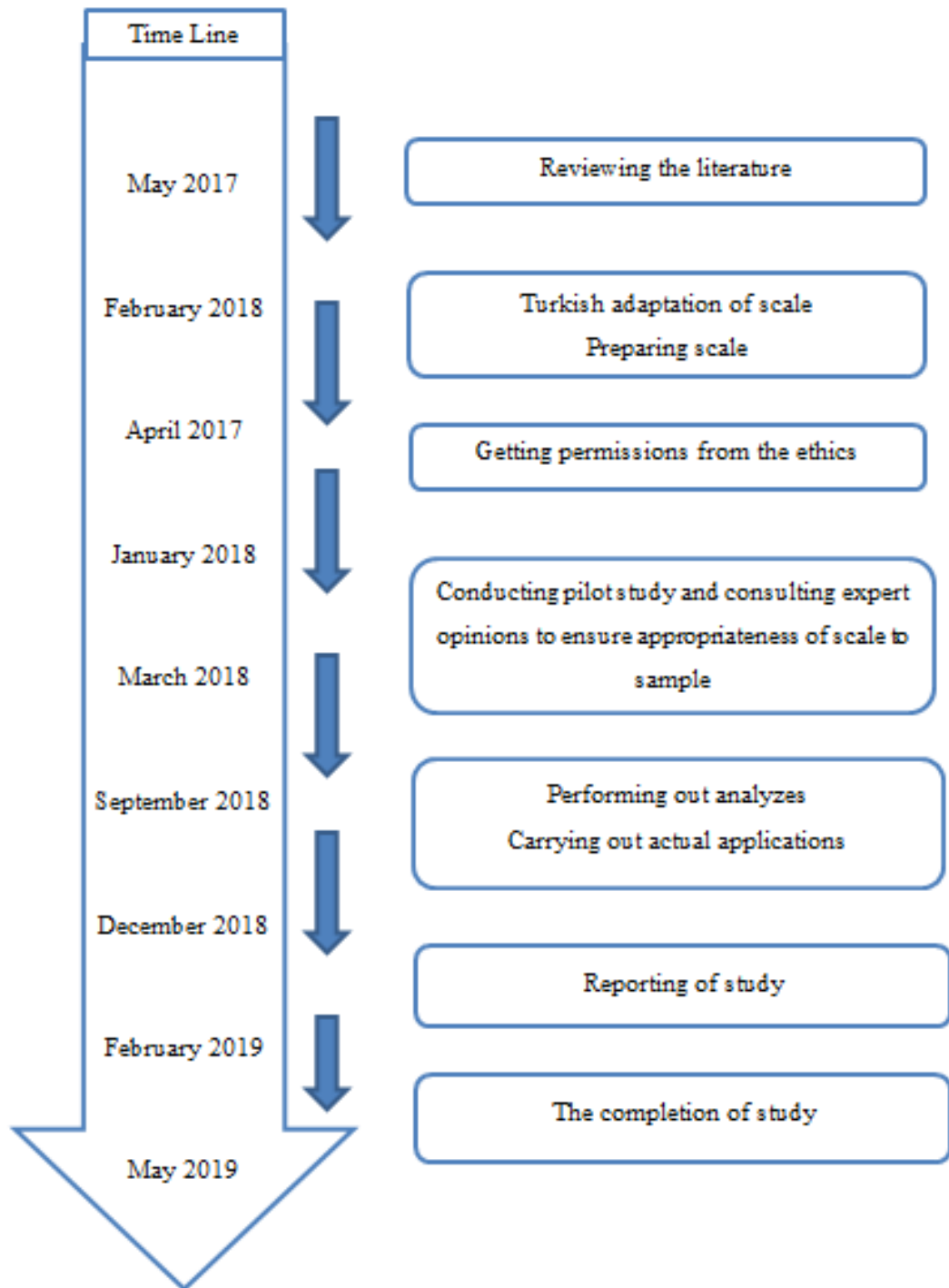


Figure 4. General overview of the current study

Within the environmental issues, providing environmental awareness, preventing environmental pollution, calculating the ecological footprint and providing

suggestions for solving environmental problems are involved in science curriculum [Ministry of National Education (MoNE), 2018]. Being aware of the relationship between human-nature, recognizing the harmful effects of humanity on nature and discussing the ways of minimizing such damage, learning the current issues such as global warming and greenhouse gas, gaining recycling habit and the importance of saving are also involved in science curriculum. Considering department of science education, pre-service science teachers who are educated in the four year elementary science education department to be middle school science teachers will teach science to students from the 5th to the 8th grade. During their education at university, they get environmental based courses. For example, 'Environmental Science' and 'Earth Science' courses contain information about environmental issues. In the 'Environmental Science' course, environment, historical development of environmental science, people and the environment, population and environment, regional and local environmental issues, water, soil, air, radioactive contamination and other sources of pollution, biodiversity and the situation in Turkey, environmental organizations and activities, environmental education and education for sustainable development are involved (Board of Higher Education, 2018). In addition, in the department of science education, some elective courses include environmental issues. When the contents of these courses are examined; some topics such as environment, environmental pollution, chemical pollution, physical pollution, biological pollution, radioactive pollution, biochemical cycles, heat exchange, energy balance, chemical and photochemical reactions in the atmosphere, air pollution, ozone depletion, greenhouse effect, acid rain, photochemical smoke, air pollutants: organic and inorganic pollutants, industrial pollutants, toxicity and elements, and city pollutants are involved. Pre-service science teachers who successfully complete all the courses in the science education department are awarded a bachelor's degree related to branches of education. Those who receive this diploma can work in government schools, private schools and classrooms affiliated to MoNE. After graduation, science

teachers in general begin to work at the schools affiliated to the MoNE in rural areas (MoNE, 2002). After gaining experience (it was determined in Turkey that at the beginning, teachers work two years as contracted teacher and four years mandatorily), teachers can be appointed to urban areas.

3.3. Population and Sample

In this study there are total 5078 people including middle school students, pre-service science teachers and science teachers as sample. Data collection were carried out with middle school students, pre-service science teachers who study at the faculty of education in four universities and science teachers in Kırşehir, Kayseri, Manisa and Ankara. The sample of the study is formed using convenience sampling that is easier for researcher in terms of expense, time and accessibility (Cohen, et al., 2007). Information about sample is given in Table 5.

Table 5. Characteristics of the Sample

Gender	Middle School		Pre-Service Science		Science		Total	
	Students		Teachers		Teachers			
	f	%	f	%	f	%	f	%
Female	1846	49	632	87	377	63	2855	56
Male	1907	51	92	13	224	37	2223	44
Total	3753	100	724	100	601	100	5078	100

3.3.1. Middle School Students

Because it is not possible to carry out this application with all these schools in Turkey, the accessible population was chosen as all middle schools in Kırşehir, Kayseri, Manisa and Ankara in Turkey. Accessible population is all middle school students in schools application carried out in these cities. Researcher applied to Prime Ministry Communication Center (BİMER) to learn the number of students in middle schools in Kırşehir, Kayseri, Manisa and Ankara in accordance with ‘right to information act’ and obtained information about

students from provincial directorate of national education. According to this information, there are totally 10535 middle school students in Kırşehir, 99.989 students in Kayseri, 82.579 students in Manisa and 281.946 students in Ankara. The number of middle school students in population is involved in terms of grade level and cities in Table 6.

Table 6 .The Number of Population of the Study (middle school students)

Grade Level	The Number of Students			
	Kırşehir	Kayseri	Ankara	Manisa
5	2474	23.217	66.387	Not obtained
6	3136	31.511	88.504	Not obtained
7	2500	23.016	65.262	Not obtained
8	2425	21.896	61.793	Not obtained
Total	10.535	99.989	281.946	82.579

In Table 7, it is seen that this study was conducted with 3733 ($N_{\text{Female}}=1838$, $N_{\text{male}}=1894$) middle school students including 401 ($N_{\text{Female}}=211$, $N_{\text{male}}=190$) students at 5th grade, 787 ($N_{\text{Female}}=402$, $N_{\text{male}}=385$) students at 6th grade, 1153 ($N_{\text{Female}}=553$, $N_{\text{male}}=600$) students at 7th grade and 1392 ($N_{\text{Female}}=672$, $N_{\text{male}}=719$) students at 8th grade. Information about sample consisting of middle school students is involved in terms gender and grade level in Table 7. Participants' mean cumulative Grade Point Average is 82.41/100 and average number of people in the class is 29.22. Majority of participants' mother is housewife (72.9%), 10% of them is worker, 5.6% of them civil servant, and 3.1% of them has self-employment. 34.5% of participants' father is worker, 15.8 of them has self-employment, 14.2% of them civil servant, 3.9% of them don't work and 3.8% of them is worker. In terms of educational level, a small percentage of fathers (2.9%) and mothers (3.2%) were illiterate. In addition, 19.6% of fathers and 29.9% of mothers had primary school degree, 24.4% of father and 28.6% of

mother has middle school degree, 33.6% of father and 27.7% of mother has high school degree and 16.1% of father and 8.4% of mother has undergraduate degree.

Table 7. The Number of Sample of the Study (Middle School Students)

Gender	Grade								Total	
	5		6		7		8			
	f	%	f	%	f	%	f	%	f	%
Female	211	52.62	402	51.08	553	47.96	672	48.28	1838	49.24
Male	190	47.38	385	48.92	600	52.04	719	51.65	1894	50.74
Total	401	100	787	100	1153	100	1392	100	3733	100

Furthermore, 3.3% of fathers and 2.1% of mothers has master degree and above. With regard to total income of family, students indicated their families' monthly income as follows: Less than 1000 Turkish Liras [TL] (10.9%), between 1001 TL and 2000 TL (33.4%), between 2001 TL and 3000 TL (25.5%), between 3001 TL and 4000 TL (13.8%), between 4001 TL and 5000 TL (8.1%), and more than 5001 TL (8.1%). Considering the information about hometown, most of the students live in city centers (75.9%), then in districts (16.5%) and village (5.1%) and lastly in town (1.3%). Considering the number of people at home, majority of them live with four (39.8%) and five people (30%), small percent of them live with one (2.1%) or two people (2.9%). 10.7% of them live with three and 14.5% of them live with six people and more. 31.8% of participants stated that the number of book at home is between 26-100, 30.3% of them stated between 11-25. While 73.9% of students have own study room and 64.5% of them have own personal computer, 25.2% of them don't have own study room and 35.1% of them don't have own personal computer. Detailed information related middle school students' demographic information is involved in Table 8.

Table 8. Demographic Characteristics of Middle School Students

	Frequency	Percentage (%)
Work status of mother		
Housewife	2706	72.9
Civil Servant	207	5.6
Worker	372	10.0
Self-Employment	116	3.1
Work status of father		
Farmer	141	3.8
Civil Servant	522	14.2
Worker	1265	34.5
Self-Employment	581	15.8
Doesn't Work	143	3.9
Educational status of mother		
Illiterate	117	3.2
Primary School	1097	29.9
Middle School	1052	28.6
High School	1019	27.7
Undergraduate	309	8.4
Master Degree	70	1.9
Doctor's Degree	8	.2
Educational status of father		
Illiterate	107	2.9
Primary School	722	19.6
Middle School	898	24.4
High School	1234	33.6
Undergraduate	592	16.1
Master Degree	115	3.1
Doctor's Degree	7	.2
Monthly income of the family		
Less than 1000 TL	375	10.9
1001 TL - 2000 TL	1148	33.4
2001 TL - 3000 TL	878	25.5
3001 TL - 4000 TL	476	13.8
4001 TL - 5000 TL	280	8.1
More than 5001 TL	277	8.1
Location		
City Center	2824	75.9
District	613	16.5
Town	50	1.3
Village	192	5.2
The number of people in family		
1	78	2.1
2	108	2.9
3	399	10.7
4	1481	39.8
5	1116	30.0
6 and more	538	14.5

Table 8. (Continued)

The number of book		
Nothing or only a few (0-10)	497	13.4
11-25	1123	30.3
26-100	1181	31.8
101-200	498	13.4
More than 200	401	10.8
Do you have a study room in your house?		
Yes	2752	73.9
No	940	25.2
Is there a computer in your house?		
Yes	2411	64.5
No	1310	35.1

3.3.2. Pre-Service Science Teachers

In this study, since all the target population related to pre-service science teachers are thought to be reached, no discrimination was done in terms of accessible population and sample. Pre-service science teachers in this research study at four middle sized universities in Turkey. In the scope of this study, a total of 720 ($N_{\text{female}}=630$, $N_{\text{male}}=90$) pre-service science teachers attended to the study. Of the sample, 87.5% ($N= 630$) were female and 12.5% ($N= 90$) were male. In the current study, it was seen that there is a remarkable difference between the number of male and female of pre-service science teachers. In the last a few years, the department of science education has been preferred by mostly female. However, there is no difference between the number of male and female of science teachers. 113 of them are freshmen, 215 of them are sophomore, 187 of them are junior and 205 of them are senior. The number of pre-service science teachers reached is involved with regard to grade level and gender in Table 9. Pre-service science teachers' mean cumulative Grade Point Average is 2.71/4. Majority of participants' mother is housewife (78.8%), 8.3% of them civil servant, 5.3% of them is worker, and 3.5% of them has self-employment. In addition, 23.1 of participants' father is self-employment, 21.8% of participants' father is civil servant, 19.8% of participants' father is worker, 9.6% of them are

worker and 5.6% of them don't work. In terms of educational level, a small percentage of fathers (1.8%) and mothers (3.9%) were illiterate.

Table 9. The Number of Pre-Service Science Teachers with regard to Grade Level and Gender

Education Level	Female		Male		Total	
	f	%	f	%	f	%
1	99	87.61	14	12.39	113	100
2	187	86.98	28	13.02	215	100
3	158	84.49	29	15.51	187	100
4	179	91.79	16	8.21	195	100
5 and more	7	70.00	3	30.00	10	100
Total	630	87.50	90	12.50	720	100

In addition, 27.9% of fathers and 45.6% of mothers had primary school degree, 17.8% of father and 18.4% of mother has middle school degree, 28.4% of father and 23.1% of mother have high school degree, and 22.3% of father and 8.6% of mother has undergraduate degree. However, only 1.8% of fathers and .4% of mothers has master degree and above. With regard to total income of family, pre-service science teachers indicated their families' monthly income as follows:: Less than 1000 Turkish Liras [TL] (7.2%), between 1001 TL and 2000 TL (28.1%), between 2001 TL and 3000 TL (24%), between 3001 TL and 4000 TL (18.1%), between 4001 TL and 5000 TL (11.9%), and more than 5001 TL (10.5%). Considering the information about hometown, most of the pre-service science teachers live in city centers (55.5%), then in districts (27.4%) and village (13%) and lastly in town (4%). Considering the number of people at home, majority of them live with four (32.9%) and five people (28%), small percent of them live with one (1.1%) or two people (2.8%). 16.1% of them live with three and 19.1% of them live with six people and more. 33.8% of participants stated that the number of book at home is between 26-100, 20.9% of them stated between 11-25. While 78.9% of pre-service science teachers have own study room and 84.3% of them have own personal computer, 20% of them don't have own study room and 15.4% of them don't have own personal computer. Detailed

information related to pre-service science teachers' demographic information is involved in Table 10.

Table 10. Demographic Characteristics related to Pre-service Science Teachers

	Frequency	Percentage (%)
Work status of mother		
Housewife	567	78.8
Civil Servant	60	8.3
Worker	38	5.3
Self-Employment	25	3.5
Work status of father		
Farmer	68	9.6
Civil Servant	155	21.8
Worker	141	19.8
Self-Employment	164	23.1
Doesn't Work	40	5.6
Educational status of mother		
Illiterate	28	3.9
Primary School	328	45.6
Middle School	132	18.4
High School	166	23.1
Undergraduate	62	8.6
Master Degree	3	.4
Educational status of father		
Illiterate	13	1.8
Primary School	201	27.9
Middle School	128	17.8
High School	205	28.4
Undergraduate	161	22.3
Master Degree	9	1.2
Monthly income of the family		
Less than 1000 TL	51	7.2
1001 TL – 2000 TL	200	28.1
2001 TL – 3000 TL	171	24.0
3001 TL – 4000 TL	129	18.1
4001 TL – 5000 TL	85	11.9
More than 5001 TL	75	10.5
Location		
City Center	401	55.5
District	198	27.4
Town	29	4.0
Village	94	13.0
The number of people in family		
1	8	1.1
2	20	2.8
3	116	16.1
4	237	32.9

Table 10. (Continued)

5	202	28.0
6 and more	138	19.1
The number of book		
Nothing or only a few (0-10)	61	8.4
11-25	151	20.9
26-100	244	33.8
101-200	134	18.6
More than 200	132	18.3
Do you have a study room in your house?		
Yes	571	78.9
No	145	20.0
Is there a computer in your house?		
Yes	609	84.3
No	111	15.4

3.3.3. Science Teachers

Researcher applied Prime Ministry Communication Center (BİMER) to learn the number of science teachers in Kırşehir, Kayseri, Manisa and Ankara in accordance with ‘right to information act’ and obtained information about science teachers from provincial directorate of national education. According to this information, there are a total of 138 science teachers in Kırşehir, 770 science teachers in Kayseri, 750 science teachers in Manisa and 2290 science teachers in Ankara. However, a total of 601 ($N_{\text{female}}=377$, $N_{\text{male}}=224$) science teachers involved in this study. Of the sample, 62.7% ($N= 377$) were female and 37.3% ($N= 224$) were male. The range of ages of science teachers was from 23 to 63 years with a mean of 37.59 and average duration of experience is 11.58 years. 72.9 of them are married, while 26.1 of them are single. Information about sample consisting of science teachers is involved in Table 11.

Table 11. Demographic Characteristics related to Science Teachers

City	Female		Male		Total	
	f	%	f	%	f	%
Kırşehir	63	49.6	64	50.4	127	100
Kayseri	96	60.0	64	40.0	160	100
Ankara	156	78.4	43	21.6	199	100
Manisa	62	53.9	53	46.1	115	100
Total	377	62.7	224	37.3	601	100

3.4.Data Collection Tools

Data collection tools consist of five parts: Demographic Information (Student Demographic Information, Teacher Demographic Information, and Pre-Service Science Teacher Demographic Information), and New Ecological Paradigm Scale, Self-Identity Scale, Fundamental Values Scale and Personal Norm Scale.

3.4.1. Demographic Information

For each study group, three different demographic information tools are prepared in line with the related literature review (e.g., Hawcroft & Milfont, 2010; Liere & Dunlap, 1980; Pienaar et al., 2013; Pienaar et al., 2015). In these studies, some of demographics characteristics are recommended to involve. For example, in a study of Hawcroft and Milfont (2010) who conduct a meta-analysis, reporting more information about demographic characteristics such as gender, age, educational level, income and NEP are suggested to provide a robust body of information. Similarly, Liere and Dunlap (1980) also proposed five hypotheses involving environmental psychology: Age hypothesis, the social-class hypothesis, the residence hypothesis, the political-ideology hypothesis and the gender hypothesis. In the current study, similarly gender, age, educational level, income and the residence area involved in the demographic information tool. In addition, some demographic characteristics such as the number of people who live at home, the number of book and whether the there is an own computer and an own study room at home are involved at demographic information tool.

4.1.1.1.Student Demographic Information

Student demographic information consisted of 22 items including age, gender, grade level, grade-point average, parents' income, parents' education level, the residence area and city students live and the name of the school they study, the number of people who live at home, the number of book, whether the there is an own computer and an own study room at home are involved at demographic

information, interest and perceived knowledge level and source of information toward environmental issues.

4.1.1.2. Teacher Demographic Information

Teacher demographic information consisted of 12 items including age, gender, university, faculty and department they study, years of experience, the city they live and name of the school they work, interest and source of information toward environmental issues.

4.1.1.3. Pre-Service Teacher Demographic Information

Pre-service science teacher demographic information consisted of 20 items including age, gender, university they study, grade level, grade-point average, parents' income, parents' education level, the residence area and city pre-service science teachers live and the name of the university they study, the number of people who live at home, the number of book, whether there is an own computer and an own study room at home are involved at demographic information, interest and source of information toward environmental issues.

3.4.2. Likert Type Scales

In this study, four types of scale were used: New Ecological Paradigm Scale, Self-Identity Scale, Fundamental Values Scale and Personal Norm Scale.

4.1.1.4. New Ecological Paradigm Scale

In the scope of the study, revised NEP scale developed by Dunlop et al. (2000) was used. Revised NEP scale includes 15 items (to provide balanced set of pro- and anti-NEP items) with five point likert type scale. Consequently, in the study, The five point Likert scale ranges from 1 (Strongly Disagree) to 5 (Strongly Agree). Internal consistency of the revised NEP scale in Dunlap et al.' (2000) study was found as .83 using Cronbach alpha. In the current study, there are two sub-dimensions of NEP which originated from Dunlap et al.' (2000) study:

Human Based Views and Nature Based Views. Cronbach Alpha Coefficient Values related to Human Based Views and Nature Based Views are included in Table 12.

Table 12. Cronbach Alpha Coefficient Values toward Human Based Views and Nature Based Views

Factors	Items	Cronbach Alpha Coefficient (α)		
		MSS	PST	ST
Human Based Views	Humans have the right to modify the natural environment to suit their needs.	.64	.66	.67
	Human ingenuity will insure that we do not make the earth unlivable.			
	The balance of nature is strong enough to cope with the impacts of modern industrial nations.			
	The so-called "ecological crisis" facing humankind has been greatly exaggerated.			
	Humans were meant to rule over the rest of nature.			
Nature Based Views	When humans interfere with nature it often produces disastrous consequences.	.68	.69	.69
	Humans are severely abusing the environment.			
	Plants and animals have as much right as humans to exist.			
	Despite our special abilities humans are still subject to the laws of nature.			
	The earth is like a spaceship with very limited room and resources.			
	The balance of nature is very delicate and easily upset.			
	If things continue on their present course, we will soon experience a major ecological catastrophe.			
We are approaching the limit of the number of people the earth can support.				

4.1.1.5.Fundamental Values

A short version of the scale developed by Schwartz (1992) was used to examine values the sample groups in the study give importance in their life. The short version of this scale was developed by Stern, Dietz, and Guagno (1998). In addition, the scale was also adapted to Turkish by Sahin, (2013). There are 12 items with 5 point likert type scale ranging from 'not all important' (0) to supreme importance' (5). Fundamental Values and Cronbach Alpha Coefficient Values are included in Table 13.

Table 13. Fundamental Values and Cronbach Alpha Coefficient Values

Factors	Items	Cronbach Alpha Coefficient (α)		
		Students	Pre-Service Science Teachers	Science Teachers
Egoistic	Authority Social Power Wealth Influential	.65	.68	.65
Altruistic	Social Justice Helpful A World At Peace Equality	.70	.72	.70
Biospheric	Unity With Nature Respecting The Earth Protecting The Environment Preventing Pollution	.70	.74	.79

4.1.1.6. Personal Norms

In the study, previously developed personal norm scale was used (e.g., Stern et al., 1999; Steg et al., 2005). It consists of 9 items ranging from absolutely disagree (1) to strongly agree (5). With this study, Turkish adaptation of the scale was performed. Information related to characteristics of personal norm scale is involved in Table 14.

Table 14. Information related to Characteristics of Personal Norm Scale

Item No	Items	Cronbach Alpha Coefficient (α)		
		MSS	PST	ST
1	I feel morally obliged to protect nature, regardless of what others do			
2	I'm willing to take action to stop environmental pollution.			
3	It is wrong for me to harm the environment.			
4	I feel guilty if I harm natural life.			
5	Protecting nature is my personal responsibility.			
6	Everyone should take responsibility to protect nature.	.83	.86	.83
7	I refrain from harming the nature because I feel obliged to nature and to other creatures.			
8	I feel a personal obligation to do whatever I can to prevent climate change.			
9	As long as I don't have to change my lifestyle, I do my best to protect the environment.			

4.1.1.7. Self-Identity

This scale developed in previous studies (e.g., Sparks & Shepherd, 1992; Van der Werff et al., 2013; Whitmarsh & O’Neill, 2010) consisting of 5 items ranging from absolutely disagree (1) to strongly agree (5). With this study, Turkish adaptation of the self-identity scales was performed.

Table 15. Information related to characteristic of self-identity scale

Item No	Items	Cronbach Alpha Coefficient (α)		
		MSS	PST	ST
1	I think of myself as a nature friendly			
2	Exhibiting environmentalist behavior is an important part of who I am			
3	I am the type of person who behave eco-friendly	.75	.84	.86
4	I think of myself as someone who is very concerned with environmental problems			
5	I see myself as a eco-friendly consumer			

Note. MSS: Middle School Students, PST: Pre-Service Science Teachers, ST: Science Teachers

3.5. Pilot Study

The pilot study was carried out to evaluate psychometric properties of the scale with three samples (N=2396) including middle school students (N=1808), pre-service science teachers (N=432) and science teachers (N=156) from various cities during 2017-2018 spring semester. Convenience sampling was used to select sample because of travel, cost and time. For the pilot study, data were checked for reliability analyses which “refers to the degree to which the items that make up the scale hang together” by using Cronbach's alpha coefficient to provide internal consistency (Pallant, 2011, p.90). During these analyses, problematic items were determined and some of them were revised, deleted or negative scale items were transformed. In the below, the pilot analyses were presented in detail. Since there are three different samples, data analyses toward pilot study were indicated under different titles. During presenting pilot study, validity and reliability results also involved in this section.

3.5.1. Validity and Reliability Studies

Validity refers to usefulness, meaningfulness, correctness, and appropriateness of inferences based on the data (Fraenkel et al., 2012). Validity needs to be done in this study, since it has a place in effective research and researcher should adapt the scale developed (Cohen, et. al., 2007; Fraenkel et al., 2012).

3.5.2. Reliability and Construct Validity of the Instruments

In the study, there are four scales including New Ecological Paradigm Scale, Fundamental Values Scale, Personal Norm Scale and Self-Identity Scale. With the factor analysis, construct validity of these scales were provided. Hence, confirmatory factor analyses were conducted with these scales. To achieve this, confirmatory factor analysis was performed by AMOS 21. Model fit indices were examined to interpret results of confirmatory factor analyses.

4.1.1.8. Confirmatory Factor Analyses toward NEP

Since there are three sample groups in this study, results were presented in three steps. Goodness of fit indices of the model for NEP according to sample groups are indicated in Table 16.

Table 16. Goodness-of-Fit Indices of the Model for NEP

Fit Indices	Values			Suggested Values
	MSS	PST	ST	
χ^2	192.50	163.20	146.99	small
df	55	60	57	-
χ^2/df	3.50	2.72	2.58	2 < < 5
CFI	.90	.91	.92	> .90
GFI	.98	.96	.96	> .90
RMSEA	.05	.06	.05	< .08
SRMR	.05	.06	.05	< .08

Note. SRMR=Standardized Root Mean Square Residual, RMSEA=Root Mean Square Error of Approximation, CFI=Comparative Fit Index, MSS= Middle School Students, PST= Pre-Service Science Teachers, ST= Science Teachers

Since chi-square test is affected from sample size (Tabacnick & Fidell, 2013), it is stated that chi-square statistics showed significant level if data were collected with larger samples (Hair, Black, Babin, & Anderson, 2010). According to Table 16, since all the values of χ^2/df are ratio range from 2 to 5 (Byrne, 2010; Marsh & Hocevar, 1985; Tabacnick & Fidell, 2013), indicator of reasonable fit can be emphasized. Since CFI and GFI values are above .90 fit (Bentler, 1990), SRMR and RMSEA values are less than .08 (Hu & Bentler, 1999), fit indices showed good fit for two-structured model of NEP scale. In addition, the value of Standardized (β) Estimates indicated good fit between model and the data. Only two items including item-5 and item-13 are dropped from the scale. Finally, after dropping two items, it was confirmed that NEP can be used to assess the middle school students' pre-service science teachers' and science teachers' ecological worldview beliefs with 'Nature Based' and 'Human Based' factors.

4.1.1.9. Reliability Results toward NEP Scale

In this scale, there are two sub-factors and three sample groups. Therefore, reliability values are presented considering these groups and sub- dimensions. Cronbach alpha reliability coefficients of sub-dimensions ranged from .60 to .68. Reliability coefficients of subscales were presented in Table 17.

Table 17. Reliability Values of Sub-dimensions of New Ecological Paradigm Scale

Subscales	Cronbach Alpha (α)		
	MSS	PST	ST
Human Based	.60	.62	.64
Nature Based	.64	.67	.68

According to Table 17, for three groups, reliability values for the subscale of Human Based are lower than subscale of Nature Based.

4.1.1.10. Confirmatory Factor Analyses toward Fundamental Values

Based on the previous studies (e.g., Stern 2000; Stern, et al., 1993), there are three sub-dimensions of fundamental values including Egoistic, Altruristic and

Biospheric and each sub-dimension have four items. Since there are three sample groups in this study, results were presented in three steps. Goodness of fit indices of the model for fundamental values according to sample groups is indicated in Table 18.

Table 18. Goodness of Fit Indices of the Model for Fundamental Values

Fit Indices	Values			Suggested Values
	MSS	PST	ST	
χ^2	156.04	192.72	215.04	small
df	38	50	51	-
χ^2/df	4.10	3.85	4.22	2 < < 5
CFI	.99	.94	.91	> .90
GFI	.99	.96	.94	> .90
RMSEA	.03	.06	.07	< .80
SRMR	.02	.51	.07	< .10

According to Table 18, since all the values of χ^2/df are ratio range from 2 to 5 (Byrne, 2010; Marsh & Hocevar, 1985; Tabacnick & Fidell, 2013), indicator of reasonable fit can be emphasized. Since CFI and GFI values are above .90 fit (Bentler, 1990), SRMR and RMSEA values are less than .08 (Hu & Bentler, 1999), fit indice values showed good fit for three-structure model of Fundamental Values scale. In addition, the value of Standardized (β) Estimates indicated a good fit between model and the data. It was affirmed that this scale can be used to assess the middle school students' pre-service science teachers' and science teachers' values with 'egoistic', 'biospheric' and 'alturistic factors.

4.1.1.11. Reliability Results toward Fundamental Values Scale

In this scale, there are three sub-factors and three sample groups. Therefore, reliability values are presented considering these groups and sub-dimensions. Cronbach alpha reliability coefficients of sub-dimensions ranged from .65 to .79. Reliability coefficients of sub-dimensions were presented in Table 19.

Table 19. Reliability Values of Sub-dimensions of Fundamental Values Scale

Subscales	Cronbach Alpha (α)		
	MSS	PST	ST
Egoistic	.65	.68	.65
Altruistic	.70	.72	.70
Biospheric	.70	.74	.79

4.1.1.12. Confirmatory Factor Analyses toward Personal Norm Scale

Considering the literature, in Steg et al.' (2005) and Stern et al.' (1999) studies, it was found that Personal Norm Scale loaded on a single factor. Therefore, in the current study, a single factor was tested. Goodness of fit indices of the model for personal norm according to sample groups is indicated in Table 20.

Table 20. Goodness of Fit Indices of the Model for Personal Norm

Fit Indices	Values			Suggested Values
	MSS	PST	ST	
χ^2	140.35	162.36	183.12	small
df	33	36	40	-
χ^2/df	4.25	4.51	4.58	$2 < < 5$
CFI	.93	.92	.90	$> .90$
GFI	.92	.91	.91	$> .90$
RMSEA	.06	.07	.06	$< .80$
SRMR	.05	.05	.07	$< .10$

According to Table 20, it was confirmed that this scale can be used to assess the middle school students' pre-service science teachers' and science teachers' personal norms.

4.1.1.13. Reliability Results toward Personal Norm Scale

In this scale, there is a factor and three sample groups. Therefore, reliability values are presented considering sample groups. Cronbach alpha reliability coefficients ranged from .80 to .88 in main study. These results showed that the scale is reliable (Nunnally, 1978). Reliability coefficients of the scale were presented in Table 21.

Table 21. Reliability Values toward Personal Norm Scale

	Cronbach Alpha (α)		
	MSS	PST	ST
Personal Norm	.81	.80	.88

4.1.1.14. Confirmatory Factor Analyses toward Self-Identity Scale

Considering the literature, in Steg et al.' (2005) and Stern et al.' (1999) studies, it was found that Personal Norm Scale loaded on a single factor. Therefore, in the current study, a single factor was tested. Goodness-of-fit indices of the model for personal norm according to sample groups are indicated in Table 22.

Table 22. Goodness-of-fit indices of the Model for Personal Norm

Fit Indices	Values			Suggested Values
	MSS	PST	ST	
χ^2	165.25	183.47	196.34	small
df	39	42	45	-
χ^2 /df	4.23	4.37	4.36	2 < < 5
CFI	.91	.92	.90	> .90
GFI	.91	.92	.92	> .90
RMSEA	.07	.06	.07	< .80
SRMR	.07	.07	.06	< .10

According to Table 22, it was confirmed that this scale can be used to assess the middle school students' pre-service science teachers' and science teachers' self-identity.

3.5.2.1. Reliability Results toward Self-Identity Scale

In this scale, there is a factor and three sample groups. Therefore, reliability values are presented considering sample groups. Cronbach alpha reliability coefficients ranged from .83 to .90. These results showed that the scale is reliable (Nunnally, 1978). Reliability coefficients of subscales were presented in Table 23.

Table 23. Reliability Values toward Self-Identity Scale

	Cronbach Alpha (α)		
	MSS	PST	ST
Self-Identity	.83	.83	.90

3.5.3. Pilot Study for Students

The scale was administered to 1808 secondary school students who study in 13 different cities in different geographical regions of Turkey (Aksaray, Antalya, Bursa, Gaziantep, Kayseri, Kırşehir, Konya, Mersin, Muğla, Siirt, Şanlıurfa, Van and Trabzon). Of the sample, 47.3 % (N = 854) were female, 52.7. % (N = 952) were male and 25.1 % (N = 453) studied at 5th grade, 30.4 % (N = 549) at 6th grade, 21.7 % (N = 393) at 7th grade and 22.6 % (N = 409) at 8th grade.

Reliability analysis was performed by using Cronbach's alpha in the pilot study. In the study, there are four different scales. Reliability values toward four Scales for Middle School Students are involved in Table 24. Results of the reliability analysis showed that Cronbach's alpha coefficients were .81, .83, .81 and .83 for “New Ecological Paradigm Scale”, “Fundamental Value Scale”, “Personal Norms Scale” and “Self-Identity Scale” respectively. According to Table 24, Cronbach Alpha values toward all scales for Middle School Students are above the recommenden values of .70 (Nunnaly, 1978).

For three scales values are higher than recommended value, while before deleting two items from self-identity scale, only Cronbach's alpha coefficient for “Self-Identity Scale” indicated unsatisfactory internal consistency ($\alpha=.63$). But, after deleting items, Cronbach's alpha value became recommended level($\alpha=.83$). Lastly, it was found that Cronbach Alpha values are not related to grade level.

Table 24. Reliability of the Scales for the Sample of Middle School Students

Name of Scale	Number of Item	Cronbach Alpha (α)	
		Grade	α level
New Ecological Paradigm	15	5	.84
		6	.80
		7	.81
		8	.76
Total			.81
Fundamental Value	12	5	.83
		6	.82
		7	.76
		8	.90
Total			.83
Personal Norms	9	5	.87
		6	.82
		7	.65
		8	.86
Total			.81
Self-Identity	7	5	.84
		6	.80
		7	.82
		8	.85
Total			.63*
			.83**

Note.* Value in the first version of scale, ** After deleting two items

4.1.1.15. Confirmatory Factor Analyses toward NEP for Middle School Students' NEP

Results of the chi-square test were obtained from middle school students as significant ($\chi^2(55)= 192.50, p < .05$) and the value of χ^2/df was founded as 3.50. CFI value was founded as .90 and GFI value was founded as .98 for the model. RMSEA was found as .05 and SRMR value was produced as .05. Latent variables, observed variables, significance value (p), the ratio of explained variance to total variance (R^2) and standardized (β) estimates of middle school students' NEP presented in Table 25. There is a non-significant result ($p=.008$) of Item-5 with the .06 value of standardized regression weights for pre-service science teachers. Considering R^2 , 0% of the changes in Human Based NEP resulted from Item-5 ($R^2=.00$). Standardized regression weights of item-13 is .19 and 4 % of the changes in Human Based NEP resulted from this item ($R^2=.02$).

Table 25. Latent Variable, Observed Variable, the Ratio of Explained Variance to Total Variance (R^2) and Standardized (β) Estimates of Middle School Students' Nature and Human Based NEP

Latent Variables	Observed Variables	p	β	R^2
Nature Based NEP	NEP 2	***	.34	.12
	NEP 4	***	.40	.16
	NEP 6	***	.37	.13
	NEP 8	***	.40	.16
	NEP 10	***	.38	.15
	NEP 12	***	.52	.27
	NEP 14	***	.49	.23
Human Based NEP	NEP 15	***	.46	.21
	NEP 1	***	.53	.27
	NEP 3	***	.56	.30
	NEP 5*	.008	.06	.00
	NEP 7	***	.44	.21
	NEP 9	***	.44	.19
	NEP 11	***	.52	.25
	NEP 13*	***	.19	.04

Note.* dropped from the scale, ***significant results ($p < .001$)

Consequently, since there are non-significant results, low standardized regression weights and the low squared multiple correlations, item-5 was dropped from the scale. In addition, because of low standardized regression weights the low squared multiple correlations values; Item-13 was dropped from the scale. One more reason why these two items were dropped is that after dropping these two items, goodness of fit indices of the model become well. Considering some of other items left in the scale, middle school students' beliefs on Item-12 was linked to Nature Based NEP ($\beta = .52$). Similarly, middle school students' beliefs on Item-3 was associated with Human Based NEP ($\beta = .56$). The changes on latent variables are resulted from observed and these changes are indicated by R^2 . Considering R^2 , 27% of the changes in Nature Based NEP resulted from Item-12 ($R^2=.27$) and 30% of the changes in Human Based NEP resulted from Item-3 ($R^2=.30$). The model fit of middle school students' NEP was presented in Figure 5.

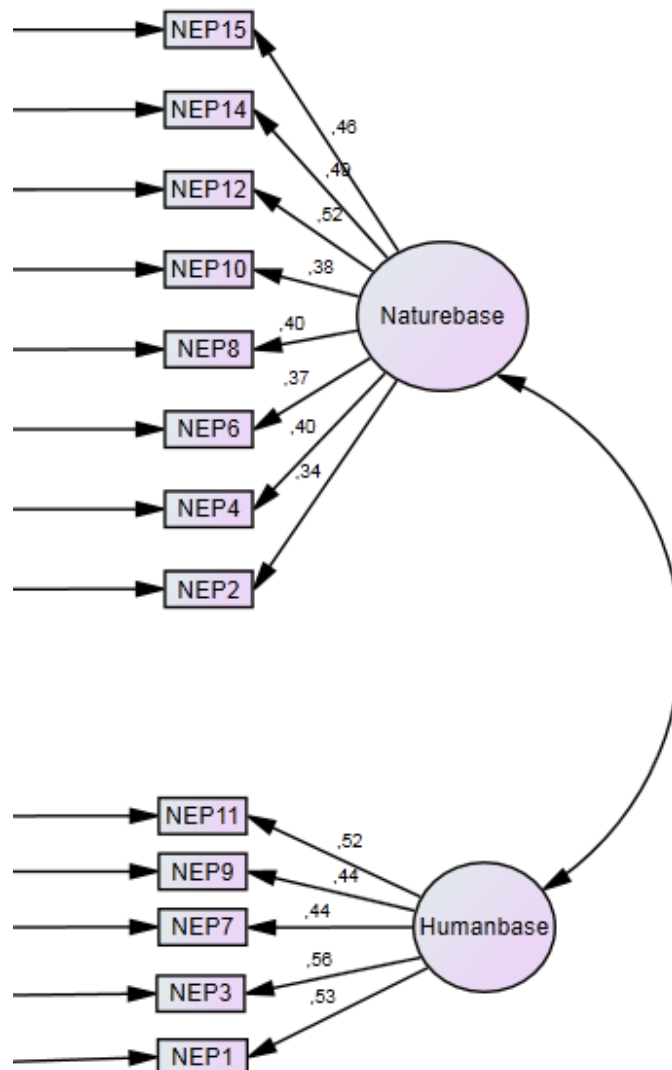


Figure 5. The Model Fit of Middle School Students' Perceptions of NEP

4.1.1.16. Confirmatory Factor Analyses toward Fundamental Values for Middle School Students

Results of confirmatory factor analyses showed that chi-square test were obtained from middle school students as significant ($\chi^2(38)= 156.04, p < .05$) and the value of χ^2/df was founded as 4.10. CFI value was founded as .99 and goodness of fit index (GFI) value founded as .99 for the current model. RMSEA was found as .03 and SRMR value was produced as .02. Latent variables, observed variables,

significance value (p), the ratio of R^2 and standardized (β) estimates of middle school students' fundamental values presented in Table 26.

Table 26. Latent Variable, Observed Variable, the Ratio of Explained Variance to Total Variance (R^2) and Standardized (β) Estimates of Middle School Students' Fundamental Values

Latent Variables	Observed Variables	p	β	R^2
Egoistic	VALUE 1	***	.32	.27
	VALUE 2	***	.45	.22
	VALUE 3	***	.24	.18
	VALUE 4	***	.67	.45
Altrustic	VALUE 5	***	.59	.35
	VALUE 6	***	.54	.29
	VALUE 7	***	.64	.41
	VALUE 8	***	.59	.35
Biospheric	VALUE 9	***	.64	.41
	VALUE 10	***	.66	.43
	VALUE 11	***	.49	.24
	VALUE 12	***	.67	.45

Note. * dropped from the scale, ***significant results ($p < .001$)

In Table 26, considering items in the scale, middle school students' values on Item-4 was linked to Egoistic Value ($\beta = .67$). Middle school students' values on Item-7 was associated with Altrustic Value ($\beta = .41$). Similarly, middle school students' values on Item-12 was linked to Biospheric Value ($\beta = .45$).

The changes on latent variables are resulted from observed and these changes are indicated by R^2 . Considering R^2 , 45% of the changes in Egoistic Values resulted from Item-4 ($R^2=.45$), 41% of the changes in Altrustic Values resulted from Item-7 ($R^2=.41$) and 67% of the changes in Biospheric Values resulted from Item-12 ($R^2=.67$). The model fit of middle school students' fundamental values was presented in Figure 6.

4.1.1.17. Reliability Analysis toward Self-Identity and Personal Norm for Middle School Students

Initially, considering middle school students, there were seven items in Self-Identity Scale. Because of low Corrected Item-Total Correlation score and reliability score ($\alpha=.63$), two items (6th and 7th items) which effect negatively internal consistency from “Self-Identity Scale” were deleted. After deleting two items, Cronbach Alpha coefficient became .83. Values related to Item-Total Statistics for “Self-Identity Scale” are indicated in Table 27. Reliability analyses showed that Cronbach Alpha value was found as .81 for middle school students.

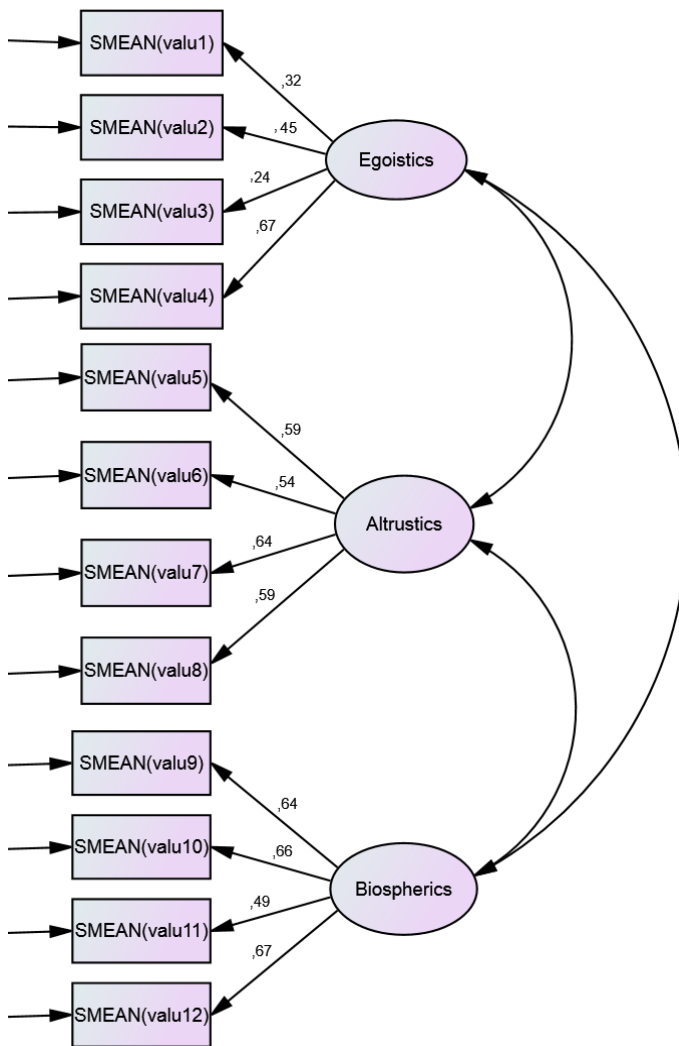


Figure 6. The Model Fit of Middle School Students' Fundamental Values

Table 27. Item Total Statistics for Self Identity Scale for Middle School Students

Item No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	I think of myself as a nature friendly	20.50	27.69	.50	.64
2	Exhibiting environmental behavior is an important part of who I am	20.65	27.68	.51	.64
3	I am the type of person who behave eco-friendly	20.71	27.35	.55	.63
4	I think of myself as someone who is very concerned with environmental problems	20.99	26.72	.54	.63
5	I see myself as a eco-friendly consumer	20.95	27.15	.50	.64
6*	I would not want my family or friends to think of me as someone who is concerned about environmental issues.	21.77	28.92	.25	.70
7*	I would be embarrassed to be seen as having an environmentally-friendly lifestyle	21.86	24.11	.26	.75

Note.*Items deleted from scale

3.5.4. Pre-Service Science Teachers

The scale was administered to 432 Pre-Service Science Teachers who study in two different universities in Turkey. Of the sample, 80.6 % (N= 348) were female, 19,4 % (N = 84) were male and 6.9 % (N = 30) studied at 1th grade, 37.5 % (N = 162) at 2nd grade, 26.9 % (N = 116) at 3rd grade, 26.9 % (N = 116) at 4th grade and 1.4 % (N = 6) at 5th and more. Reliability values of the four scales for the sample of pre-service science teachers are involved in Table 28.

Table 28. Reliability of the Four Scales for the Sample of Pre-Service Science Teachers

Name of Scale	Number of Item	Cronbach Alpha (α)	
New Ecological Paradigm	15	.63	
Fundamental Value	12	.85	
Personal Norms	9	.88	
Self-Identity	7	.65*	.83**

Note. *Value in the first version of scale, ** After deleting two items

According to Table 28, Cronbach's alpha coefficients were .63, .85, .88 and .65 for “New Ecological Paradigm Scale”, “Fundamental Value Scale”, “Personal Norms Scale” and “Self-Identity Scale” respectively. However, in “New Ecological Paradigm Scale”, even if any item was deleted, Cronbach Alpha coefficient level didn't increase. Therefore, no items were deleted. Initially, Cronbach's alpha coefficient for “Self-Identity Scale” was .65, but after deleting two items the value became .83. Lastly, the values for “Fundamental Value Scale”, “Personal Norms Scale” are above the recommended value of .70 (Nunnally, 1978).

4.1.1.18. Confirmatory Factor Analyses toward NEP for Pre-Service Science Teachers'

Results of the chi-square test were obtained from pre-service science teachers as significant ($\chi^2(60)= 163.20, p < .05$) and the value of χ^2/df was founded as 2.72. CFI value founded as .91 and GFI value founded as .96 for the model. RMSEA was found as .06 and SRMR value was produced as .06. Latent variables, observed variables, significance value (p), the ratio of R^2 and standardized (β) estimates of pre-service science teachers' NEP were presented in Table 29. In Table 29, there is a non-significant result ($p=.005$) of Item-5 with the .13 value of standardized regression weights for pre-service science teachers. Considering R^2 , 2 % of the changes in Human Based NEP resulted from Item-5 ($R^2=.02$). Standardized regression weights of item-13 (i.e., “Humans will eventually learn

enough about how nature works to be able to control it”) is .17 and 2 % of the changes in Human Based NEP resulted from this item ($R^2=.02$).

Table 29. Latent Variable, Observed Variable, the Ratio of Explained Variance to Total Variance (R^2) and Standardized (β) Estimates of Pre-Service Science Teachers’ Nature and Human Based NEP

Latent Variables	Observed Variables	p	β	R^2
Nature Based NEP	NEP 2	***	.31	.10
	NEP 4	***	.36	.13
	NEP 6	***	.48	.24
	NEP 8	***	.17	.03
	NEP 10	***	.21	.04
	NEP 12	***	.39	.15
	NEP 14	***	.72	.53
	NEP 15	***	.60	.36
Human Based NEP	NEP 1	***	.52	.27
	NEP 3	***	.48	.24
	NEP 5*	.005	.13	.02
	NEP 7	***	.30	.08
	NEP 9	***	.68	.44
	NEP 11	***	.58	.33
	NEP 13*	***	.17	.03

Note.* dropped from the scale, ***significant results ($p<.001$)

Consequently, since there are non-significant results, low standardized regression weights and the low squared multiple correlations, item-5 (I.e, “*The earth has plenty of natural resources if we just learn how to develop them*”) was dropped from the scale. In addition, because of low standardized regression weights the low squared multiple correlations values; Item-13 was dropped from the scale. One more reason why these two items were dropped is that after dropping these two items, goodness of fit indices of the model become well. However, even though some items such as Item-8 and Item-10 have low standardized regression weights and the low squared multiple correlations values, since dropping these items become goodness of fit indices worse, these items weren’t dropped. Considering some of other items left in the scale, pre-service science teachers’ beliefs on Item-14 was linked to Nature Based NEP ($\beta = .72$). Similarly, pre-

service science teachers' beliefs on Item-9 was associated with Human Based NEP ($\beta = .68$). The changes on latent variables are resulted from observed and these changes are indicated by R^2 . Considering R^2 , 53% of the changes in Nature Based NEP resulted from Item-14 ($R^2=.53$) and 44% of the changes in Human Based NEP resulted from Item-9 ($R^2=.44$). The model fit of pre-service science teachers' NEP was presented in Figure 7.

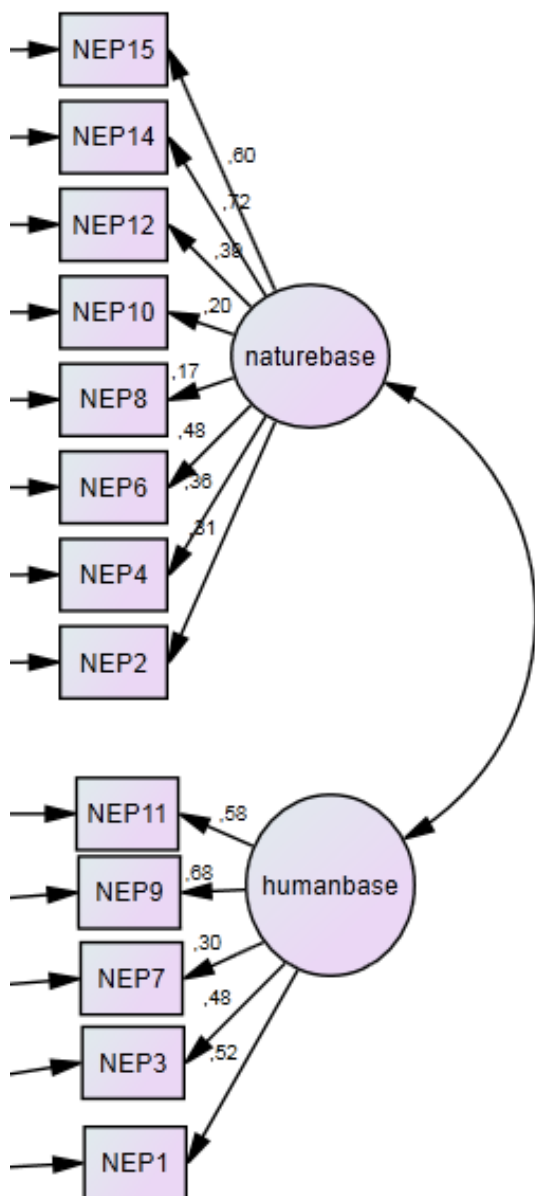


Figure 7. The Model Fit of Pre-Service Science Teachers' Perceptions of NEP

4.1.1.19. Confirmatory Factor Analyses of Pre-Service Science Teachers' Fundamental Values

Results of confirmatory factor analyses showed that chi square test were obtained from pre-service science teachers as significant ($\chi^2(57)= 215.04, p < .05$) and the value of χ^2/df was founded as 4.22. CFI value was founded as .91 and GFI value founded as .94 for the current model. RMSEA was found as .07 and SRMR value was produced as .07. Latent variables, observed variables, significance value (p), the ratio of R^2 and standardized (β) estimates of pre-service science teachers' fundamental values were presented in Table 30.

Table 30. Latent Variable, Observed Variable, the Ratio of Explained Variance to Total Variance (R^2) and Standardized (β) Estimates of Pre-Service Science Teachers' Fundamental Values

Latent Variables	Observed Variables	p	β	R^2
Egoistic	VALUE 1	***	.75	.57
	VALUE 2	***	.52	.27
	VALUE 3	***	.36	.13
	VALUE 4	***	.68	.46
Altruistic	VALUE 5	***	.68	.47
	VALUE 6	***	.58	.33
	VALUE 7	***	.65	.47
	VALUE 8	***	.53	.28
Biospheric	VALUE 9	***	.66	.43
	VALUE 10	***	.70	.49
	VALUE 11	***	.53	.28
	VALUE 12	***	.68	.47

Note. *** significant results ($p < .001$)

In Table 30, considering items in the scale, pre-service science teachers' values on Item-1 was linked to Egoistic Value ($\beta = .75$). Pre-service science teachers' values on Item-5 was associated with Altruistic Value ($\beta = .68$). Similarly, pre-service science teachers' values on Item-10 was linked to Biospheric Value ($\beta = .70$). The changes on latent variables are resulted from observed and these changes are indicated by R^2 . Considering R^2 , 57% of the changes in Egoistic Values resulted from Item-1 ($R^2=.57$), 47% of the changes in Altruistic Values

resulted from Item-5 ($R^2=.47$) and 49% of the changes in Biospheric Values resulted from Item-10 ($R^2=.49$). The model fit of pre-service science teachers' fundamental values was presented in Figure 8.

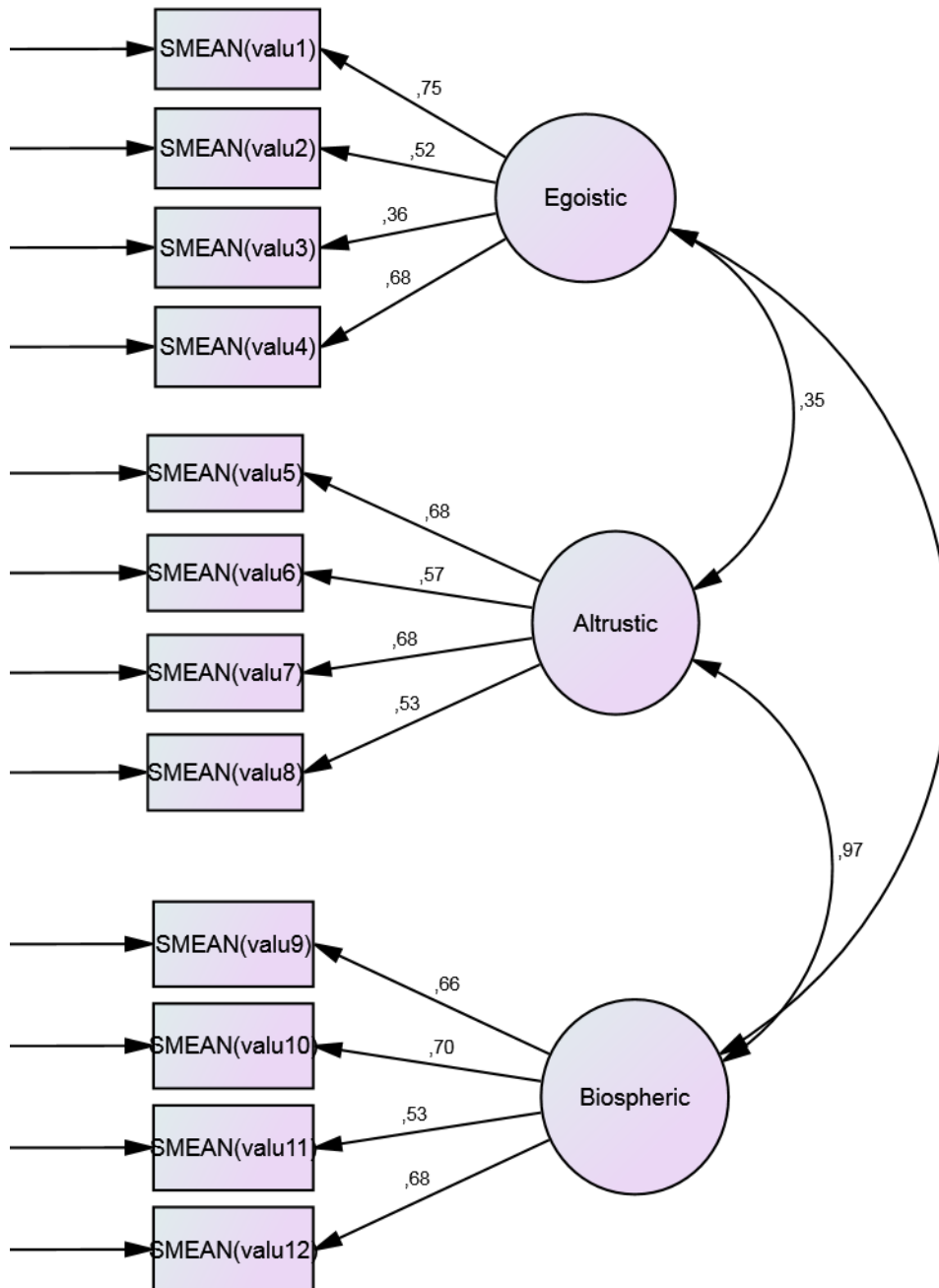


Figure 8. The Model Fit of Pre-Service Science Teachers' Fundamental Values

4.1.1.20. Reliability Analysis toward Self-Identity and Personal Norm for Pre-service Science Teachers

Initially, considering pre-service science teachers there were seven items in Self-Identity Scale. Because of low Corrected Item-Total Correlation score and reliability score ($\alpha=.63$), two items (6th and 7th items) which effect negatively internal consistency from “Self-Identity Scale” were deleted. After deleting two items, Cronbach Alpha coefficient became .83 Values related to Item-Total Statistics for “Self-Identity Scale” are indicated in Table 31. Reliability analyses showed that Cronbach Alpha value was found as .80 for pre-service science teachers.

Table 31. Item Total Statistics for Self Identity Scale for Pre-Service Science Teachers

Item No	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	23.81	11.34	.46	.59
2	23.67	11.86	.42	.61
3	23.80	11.37	.56	.58
4	24.05	10.94	.47	.58
5	24.01	11.61	.34	.62
6*	23.97	10.83	.26	.66
7*	23.84	10.59	.24	.68

Note.*Deleted from scale

3.5.5. Science Teachers

The scale was administered to 156 science teachers in total, 155 Science Teachers who work in 46 different cities in Turkey (Adana, Adıyaman, Afyonkarahisar, Aksaray, Antalya, Ankara, Aydın, Bayburt, Bingöl, Bursa, Çorum, Denizli, Diyarbakır, Eskişehir, Gaziantep, Giresun, Hatay, Iğdır, Isparta, İstanbul, İzmir, Kahramanmaraş, Kayseri, Kırıkkale, Kırşehir, Kocaeli, Konya, Malatya, Manisa, Mardin, Mersin, Muğla, Muş, Nevşehir, Ordu, Osmaniye, Sakarya, Samsun, Şanlıurfa, Siirt, Sivas, Şırnak, Trabzon, Tokat, Van and Yozgat) and one teacher who work in Turkish Republic of Northern Cyprus. Of the sample, 57.1% (N= 89) were female, 42.9.% (N= 67) were male. Reliability results of the Scales for the Sample of Science Teachers are involved in Table 32.

Table 32. Reliability of the Scales for the Sample of Science Teachers

Name of Scale	Number of Item	Cronbach Alpha (α)	
New Ecological Paradigm	15	.68	
Fundamental Value	12	.79	
Personal Norms	9	.80	
Self-Identity	7	.73*	.90**

Note. *Value in the first version of scale, ** After deleting two items

According to Table 32, Cronbach's alpha coefficients were .68, .79, .80 and .73 for “New Ecological Paradigm Scale”, “Fundamental Value Scale”, “Personal Norms Scale” and “Self-Identity Scale” respectively. For three scales, values are higher than recommended value; Cronbach's alpha coefficient for “New Ecological Paradigm Scale” indicates unsatisfactory internal consistency. However, in “New Ecological Paradigm Scale”, even if any item was deleted, Cronbach Alpha coefficient level didn't increase significantly. In addition, since items were obtained from previous studies published in Turkish language provided internal consistency several times and in the current study, results of pilot study conducted with elementary students showed Cronbach's alpha coefficient for the scale was acceptable, it is not needed that items were deleted. Since results of three different samples are compared, in the general of scales, same items should be included. Therefore, two items (6th and 7th items) deleted in the scale of students and pre-service teachers sample were also deleted in the sample of science teachers from “Self-Identity Scale”. After deleting two items from this scale, Cronbach Alpha coefficient level was .90.

4.1.1.21. Confirmatory Factor Analyses of Science Teachers' NEP

Results of confirmatory factor analyses showed that chi square test were obtained from science teachers as significant ($\chi^2(57)= 146.96, p < .05$) and the value of χ^2/df was founded as 2.58. CFI value founded as .92 and GFI value founded as .96 for the current model. RMSEA was found as .06 and SRMR value was produced as .05. Latent variables, observed variables, significance value (p), the ratio of R^2 and standardized (β) estimates of science teachers' NEP were presented in Table 33. After confirmatory factor analysis it was found that there

are non-significant results for Item-5 (I.e, The earth has plenty of natural resources if we just learn how to develop them, $p=.68$) and Item-13 (I.e, Humans will eventually learn enough about how nature works to be able to control it, $p=.12$) for science teachers.

Table 33. Latent Variable, Observed Variable, the Ratio of Explained Variance to Total Variance (R^2) and Standardized (β) Estimates of Science Teachers' Nature and Human Based NEP

Latent Variables	Observed Variables	p	β	R^2
Nature Based NEP	NEP 2	***	.16	.03
	NEP 4	***	.29	.09
	NEP 6	***	.45	.20
	NEP 8	***	.26	.07
	NEP 10	***	.56	.31.
	NEP 12	***	.50	.25
	NEP 14	***	.59	.36
	NEP 15	***	.33	.11
Human Based NEP	NEP 1	***	.43	.18
	NEP 3	***	.36	.13
	NEP 5*	.68	.02	.00
	NEP 7	***	.46	.22
	NEP 9	***	.75	.57
	NEP 11	***	.68	.47
	NEP 13*	.12	.14	.02

Note.* dropped from the scale, ***significant results ($p<.001$)

Standardized regression weight value is .02 for Item-5 and is .14 for Item 13. R^2 , 0 % of the changes in Human Based NEP resulted from Item-5 ($R^2=.00$) and .02 % of the changes in Human Based NEP resulted from item-13 ($R^2=.02$). Consequently, since there are non-significant results, low standardized regression weights and the low squared multiple correlations values, these two items were dropped from the scale. After dropping these items, goodness of fit indices of the model become well. However, even though some items such as Item-2 (I.e, “When humans interfere with nature it often produces disastrous consequences.”) have low standardized regression weights and the low squared multiple correlations values, since dropping this item become goodness of fit indices worse, this items weren’t dropped. Considering some of other items left in the

scale, science teachers' beliefs on Item-14 (I.e, If things continue on their present course, we will soon experience a major ecological catastrophe.) was linked to Nature Based NEP ($\beta = .59$). Similarly, science teachers' beliefs on Item-9 was associated with Human Based NEP ($\beta = .75$). The changes on latent variables are resulted from observed and these changes are indicated by R^2 . Considering R^2 , 36% of the changes in Nature Based NEP resulted from Item-14 ($R^2=.36$) and 57% of the changes in Human Based NEP resulted from Item-9 (I.e, The so-called "ecological crisis" facing humankind has been greatly exaggerated. ($R^2=.57$)). The model fit of science teachers' NEP was presented in Figure 9.

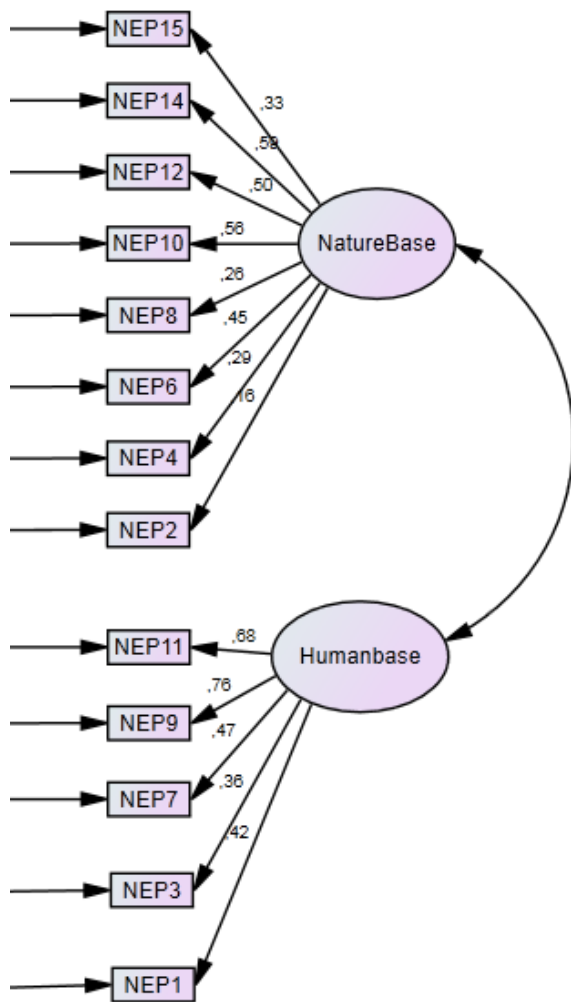


Figure 9. The model fit of Science Teachers' Perceptions of NEP

4.1.1.22. Confirmatory Factor Analyses of Science Teachers' Fundamental Values

Results of confirmatory factor analyses showed that chi-square test were obtained from science teachers as significant ($\chi^2(57)= 215.04, p < .05$) and the value of χ^2/df was founded as 4.22. CFI value founded as .91 and GFI value founded as .94 for the current model. RMSEA was found as .07 and SRMR value was produced as .07. Latent variables, observed variables, significance value (p), the ratio of R^2 and standardized (β) estimates of science teachers' fundamental values were presented in Table 34.

Table 34. Latent Variable, Observed Variable, the Ratio of Explained Variance to Total Variance (R^2) and Standardized (β) Estimates of Science Teachers' Fundamental Values

Latent Variables	Observed Variables	p	β	R^2
Egoistic	VALUE 1	***	.74	.55
	VALUE 2	***	.54	.29
	VALUE 3	***	.32	.10
	VALUE 4	***	.49	.24
Altrustic	VALUE 5	***	.62	.38
	VALUE 6	***	.47	.22
	VALUE 7	***	.76	.58
	VALUE 8	***	.60	.36
Biospheric	VALUE 9	***	.67	.45
	VALUE 10	***	.81	.65
	VALUE 11	***	.63	.40
	VALUE 12	***	.67	.45

Note. *** Significant results ($p < .001$)

In Table 34, considering items in the scale, science teachers' values on Item-1 was linked to Egoistic Value ($\beta = .74$). Science teachers' values on Item-7 was associated with Altrustic Value ($\beta = .76$). Similarly, science teachers' values on Item-10 was linked to Biospheric Value ($\beta = .81$). The changes on latent variables are resulted from observed and these changes are indicated by R^2 . Considering R^2 , 55% of the changes in Egoistic Values resulted from Item-1 ($R^2=.55$), 58% of the changes in Altrustic Values resulted from Item-7 ($R^2=.58$) and 65% of the

changes in Biospheric Values resulted from Item-10 ($R^2=.65$). The model fit of science teachers' fundamental values was presented in Figure 10.

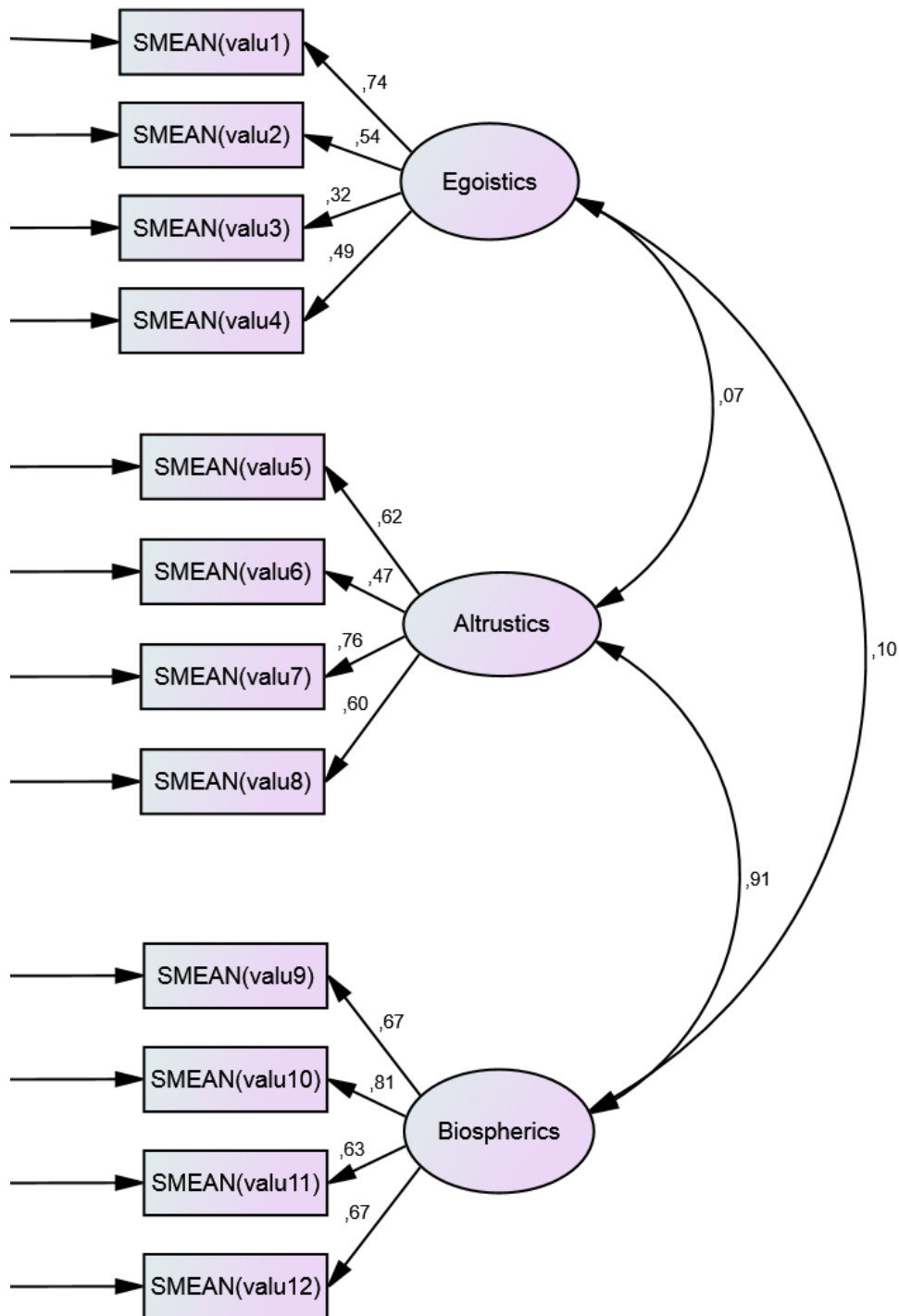


Figure 10. The Model Fit of Science Teachers' Fundamental Values

3.6.Data Collection for the Main Study

After obtaining permissions from Middle East Technical University Human Subjects Ethics Committee (see Appendix A), Ministry of National Education (see Appendix B) and selected four universities (see Appendix C-D-E) for main study, four cities for selection of middle school students and science teachers determined and the data were collected in 2018-2019 education period. After researcher explained the purpose of the study to the school principal, that participants' names and responses would be kept concealed, he introduced himself to the students, pre-service science teachers and science teachers, all the scales were administered by the researcher to be sure about consistency of procedure of data collection. In this application, totally 5078 data were collected. The questionnaires took around 30 minutes to complete and answered in the same class hour.

3.7.Data Analysis Procedure for the Main Study

Current study assess middle school students', pre-service science teachers' and science teachers' ecological worldview (nature based and human based), fundamental values (egoistic, altruistic and biospheric), personal norm and self-identity. In addition, the study presents a conceptual model explaining the relationships between these variables using SEM. In the study, in order to perform statistics analysis SPSS 21 and AMOS 21 programs were used. Before structural equation modeling, firstly, finding missing values, testing assumptions and testing normality were assessed by using SPSS 21. Measuring central tendency measures such as mode, median, mean, frequency and standard deviation, descriptive analysis, and providing construct validity were also assessed through SPSS 21. CFA and Path Analysis via SEM were conducted through using AMOS 21.

3.7.1. Testing Assumptions

Path model of the study was assumed based on the association among ecological worldview, fundamental values, personal norm and self-identity. Assumptions of path analysis met so as to obtain reliable results. Because path analysis is basically an extension and specific application of multiple regressions, assumptions of multiple regressions are feasible for the present analysis. The assumptions of multiple regressions consist of sample size, homoscedasticity, linearity and normality, independence of residuals and multicollinearity and singularity.

There are several ways to check assumption of sample size. Among them, Stevens (1996, p. 72) recommends that “*for social science research, about 15 subjects per predictor are needed for a reliable equation*”. According to Tabachnick and Fidell’ (2014), for sample size assumption, it should be verified that $N > 50 + 8m$ (m = number of independent variables). In this study, there are total 5072 people including middle school students, pre-service science teachers and science teachers and five independent variable including age, gender, parents’ income, parents’ education level and the residence area, so this assumption is provided.

Multicollinearity and singularity “*refers to that Multicollinearity exists when the independent variables are highly correlated and singularity occurs when one independent variable is actually a combination of other independent variables*” (Pallant, 2011, p. 142). Since multicollinearity and singularity don’t make contribution for acceptable regression model, it should be always checked for these problems before start analysis. In this study, since none of the independent variables are highly associated, it can be stated that this assumption is satisfied. The residuals were normally distributed related to the predicted dependent variable scores, the residuals had a straight line relationship with predicted dependent variable scores and the variance of the residuals related to predicted dependent variable were same for predicted scores.

Table 35. Correlation Analysis to Test Multicollinearity and Singularity

	NEP	Fundamental Values	Personal Norm	Self-Identity
NEP	1			
Fundamental Values	.31	1		
Personal Norm	.28	.57	1	
Self-Identity	.24	.41	.60	1

3.8. Internal Validity Threats

Internal validity can be described that “*observed differences on the dependent variable are directly related to the independent variable, and not due to some other unintended variable*” (Fraenkel et al., 2012, p. 166). In the present study, possible internal validity threats can be as subject characteristic, instrumentation (data collector characteristics and data collector bias) and location. In this study there are some variables of sample such as, ability, age, gender, experience and socioeconomic status which can affect study results in unintended ways that are related to the variables. Therefore, this situation can lead to the threat of subject characteristic and it can be emphasized that it can be one of the limitations of this study. In order to minimize the threat of instrumentation which can be occurred if the study was carried out by more than one person, study was tried to be conduct and by the researcher. Since this study was carried out in different middle schools and universities in different 47 cities and it is not possible to hold location constant, location threat can be occurred. But, since applications were conducted in similar environment and at the beginning of the semester, it can be said that this threat can be minimized.

3.9. External Validity of the Study

External validity is related that researchers generalize the findings of a particular study to particular study to people or settings that go beyond specific individuals or environments used in the study (Fraenkel et al., 2012). In this study, since

convenience sampling rather than simple random sampling was preferred, it is not possible to generalize the study to all middle school students, pre-service science teachers and science teachers in Turkey. The results can generalize to target population in the study.

3.10. Assumption and Limitation of the Study

The current study has some assumptions.

1. It is assumed that responses to the instruments including New Ecological Paradigm Scale, Fundamental Values Scale, Personal Norms Scale and Self-Identity Scale used in the present study understand the items and their meanings.
2. It is assumed that sample in the study answered the questions properly and sincerely.
3. Data collection instruments were administered under standard conditions.
4. There was no interaction among participations during the administration of the instruments.
5. Characteristics of sample represented the population.
6. It was assumed that there is no internal validity threat.
7. The sample was provided that their answers would be kept concealed so as to decrease any kind of pressure of personal exposure.
8. Characteristics of participating middle school students, pre-service science teachers and science teachers represented the population.

Additionally, present study has also some limitations.

1. Sample is limited with middle school students, pre-service science teachers and science teachers.
2. Due to time and economic considerations, the main study is limited with only a few cities in Turkey. However, in both pilot and main study, middle schools and universities to be included in the study were selected by using convenience sampling.

3. This study was conducted with some quantitative research methods. Accordingly, it is desirable for future studies to make use of additional qualitative research methods to verify the consistency and accuracy of self-reported data.
4. As present study includes self-report data, findings of the study may be affected at some level because of response bias. Particularly, in the context of this study it was not easy to measure middle school students, pre-service science teachers and science teachers' actual feelings. Therefore, the future research may overcome this problem by finding more reliable measurement approaches such as interviewing in different time intervals.
5. The results of study were limited to the several instruments including New Ecological Paradigm Scale, Fundamental Values Scale, Personal Norms Scale and Self-Identity Scale with 5078 people from four cities. That is, this number of sample may not be representative of the population.

CHAPTER 4

RESULTS

This chapter includes preliminary analyses, descriptive statistics and inferential analysis. In the preliminary data analysis, data cleaning, accuracy of data, missing data and checking outliers are involved. The descriptive statistics include item score, total mean score, frequency distributions and standard deviations of variables including middle school students', pre-service teachers' and science teachers' ecological worldviews, fundamental values, personal norms and self-identities. Finally, structural equation model analysis involves assumptions of path analysis and model testing processes were involved in the section of inferential statistics.

4.1.Preliminary Analysis

This analysis was performed to see if the data set is suitable for making statistical analyzes.

4.1.2. Data Screening Procedures

This procedure consists of data cleaning, accuracy of data (minimum and maximum values of items), missing data treatment and checking outliers which means above or below the majority of data. During entering data into the computer, minimum and maximum values of items were checked. After checking continuous variable, there are some missing values in some variables and also problems in the minimum and maximum values which are out of range (e.g., data were entered to the computer as 55, 44 and 22 etc. instead of 5,4 and 2) in demographic characteristics and dependent variables including ecological worldview beliefs, fundamental values, personal norms and self-identities. In

order to solve these problems, extreme values are edited. Missing values were checked with missing value analysis for items in the scales used in the study. Results of missing values checked variables including ecological worldview beliefs, fundamental values, personal norms and self-identities for three kind of sample groups including middle school students, pre-service science teachers and science teachers are presented in Table 36.

Table 36. Checking Missing Values

	Missing Values (%)				p
	Ecological Worldview Beliefs	Fundamental Values	Personal Norms	Self-Identities	
Middle School Students	3.20	2.50	4.9	4.10	.06
Pre-Service Science Teachers	4.50	4.80	3.70	4.70	.87
Science Teachers	4.80	4.10	3.10	3.90	.91

Items were analyzed to determine the missing data percentages. According to Table 36, missing values checked for dependent variables ranged from 2,5 to 4,9 and EM Estimated Statistics showed that missing values distributed non randomly ($p>.05$). Accordingly, since the number of the missing values is less than 5 % in all of the scales, it was decided that this values are acceptable and don't affect data set seriously (Tabachnick & Fidell, 2014). However, to eliminate missing values the analysis of 'replace missing values' was conducted in accordance with 'series mean'. To perform outlier analysis, box plots, 5% trimmed mean values and histograms were examined for each variable. For histogram, after examining tails of the distribution, it is seen that there data are points sitting on their own and scores drop away in a reasonably even slope. For box plots, no extreme data points in this analysis revealed. After comparing difference between original mean and this new trimmed mean was made, it is seen that the two mean values are very similar for all of the scaled for all sample group.

4.2.Descriptive Statistics

Descriptive statistics were conducted so as to see the profile of middle school students, pre-service science teachers and science teachers regarding background characteristics, ecological worldview beliefs, self-identities, personal norms and fundamental values.

4.2.1. Background Characteristics

This section presents the findings related to descriptive statistics of participants' perceptions of knowledge and interest in environmental issues and the source of information regarding environmental issues.

4.2.1.1.Self-Perceived Interests in Environment

Frequency distribution related to self-perceived interests in environmental issues was given in Figure 11. Many of middle school students (62.9%) and pre-service science teachers (67.5%) and near half of science teachers (46.4%) stated that their interest as 'some', while a quarter of students (25.4%), and pre-service science teachers (26.3%) reported that they had a too much interest in environmental issues, almost half of science teachers (45.9%) stated as too much interest in environmental issues. Small proportion of them reported having very little interest and a few rated them as never interest in environmental issues.

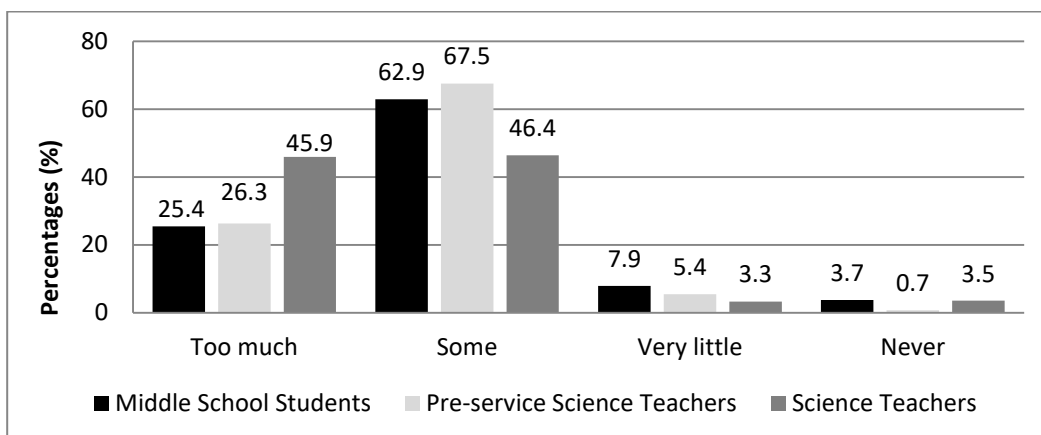


Figure 11. Frequency distribution of self-perceived interest in environment

Views of about environmental problems are involved in Figure 12. More than half of middle school students (58.1%) and more than three quarters of pre-service science teachers (78.4%) and science teachers (80.7%) believe that ‘environmental problems are among two or three important problems facing today’ and more than quarter of middle school students (35.1%) and less than one fifth of pre-service science teachers (19.9%) and science teachers (11.5%) believe that environmental problems are important, but there are other important problems. Only a few reported that environmental problems are not important and they don't see environmental problems as a problem.

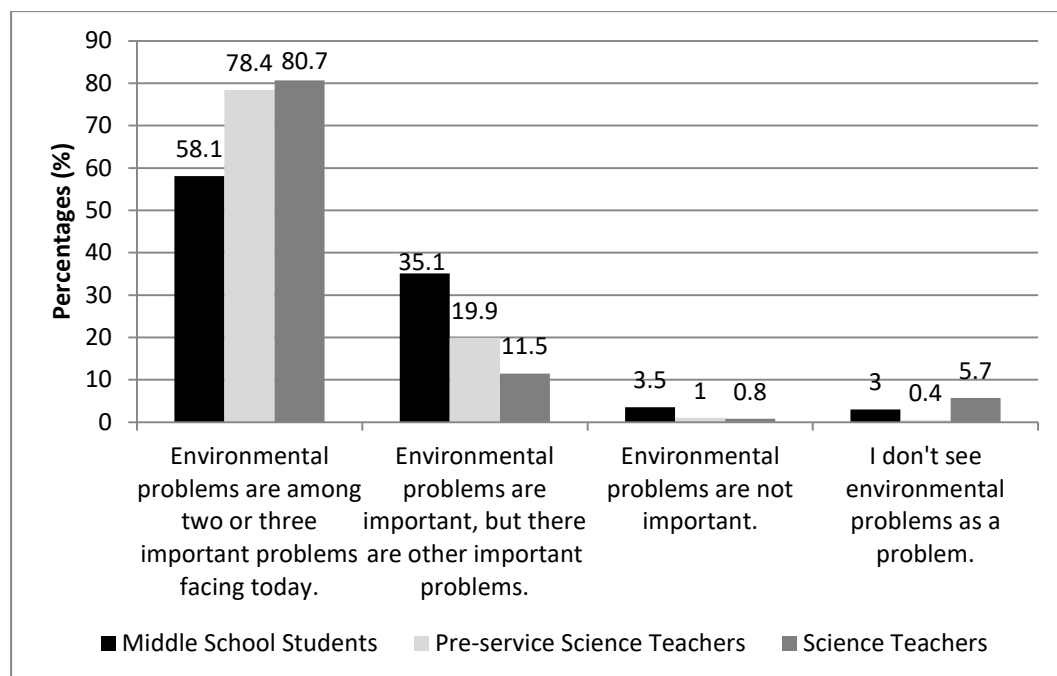


Figure 12. Frequency distribution of views about environmental problems

Views about whether environmental problems in Turkey are very overrated are involved in Figure 13. More than half of middle school students (51.9%) and more than three quarters of pre-service science teachers (84.4%) and science teachers (86.4%) believe that environmental problems in Turkey is not overrated, while less than a quarter of students (17.2 %) and less than one-tenth of pre-

service teachers (6.8%) and science teachers (6%) believe that environmental problems in Turkey is overrated.

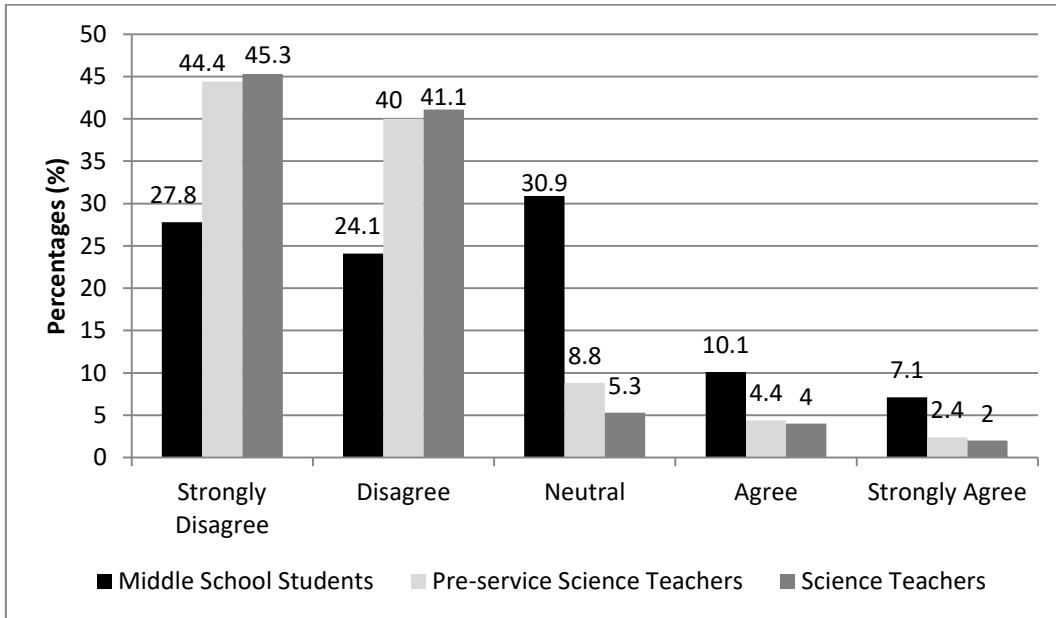


Figure 13. Frequency distribution regarding views about whether environmental problems in Turkey are overrated

4.2.1.2. Self-Perceived Knowledge in Environmental Issues

Frequency distribution related to self-perceived knowledge in environmental issues was given in Figure 14. Half of students (51.5%) and pre-service science teachers (50.8%) and one seventh of science teachers (70.4%) reported themselves as “enough” knowledgeable in environmental issues. While quarter of students (25.9%), more than quarter of pre-service teachers (38.9%) and less than one-tenth of science teachers (9.5%) stated they have some knowledge level. Only small part of them thought that they have too much knowledge level about environmental issues, they have no idea and they don’t know.

4.2.1.3. Source of Information related to Issues in Environmental Context

Source of information including ‘Newspapers and Magazines’, ‘Visiting Websites’, ‘Television / Radio Programs’, ‘Participating in Voluntary Work on

the Environment', 'From Textbooks' and 'From My Friends' regarding issues in environment were asked and five options were given from strongly disagree to strongly agree.

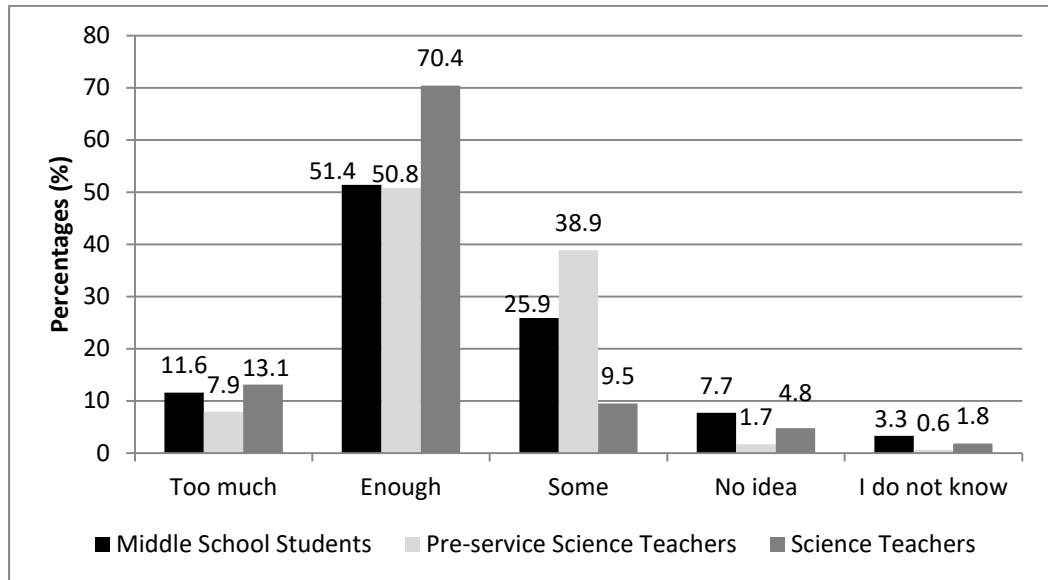


Figure 14. Frequency distribution regarding self perceived knowledge in environmental issues

In this sub-section, the results are given separately for each source type under the figures. Frequency distribution related to source of information as 'Newspapers and Magazines' was presented in Figure 15.

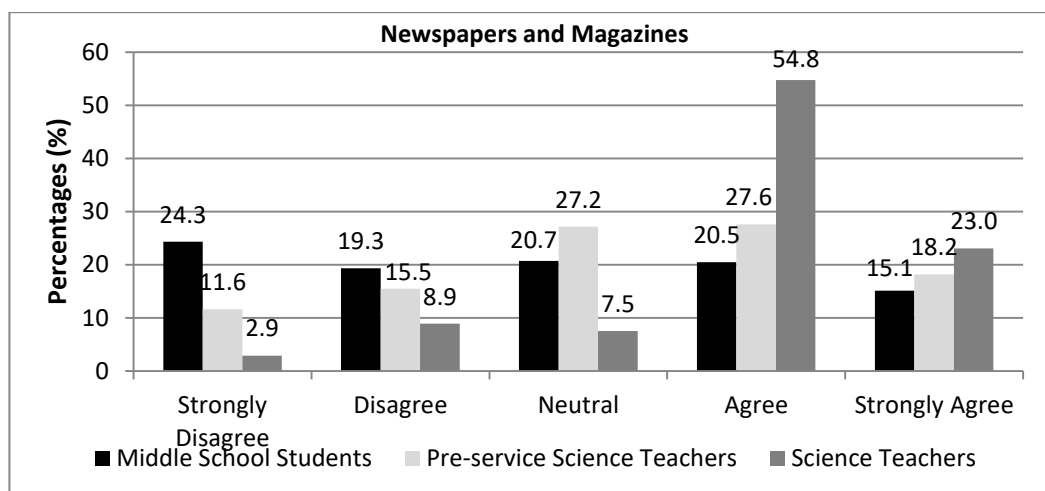


Figure 15. Frequency distribution related to source of information as 'Newspapers and Magazines'

According to Figure 15, more than quarter of middle school students (35.6%) and pre-service science teachers (45.8%) and more than three quarters of science teachers (77.8%) stated that they use ‘Newspapers and Magazines’ as a source of information related to environmental issues. However, more than quarter of middle school students (43.7%) and pre-service science teachers (27%) and one-tenth of science teachers (11.8%) stated that they don’t use newspapers and magazines as source of information. Frequency distribution related to source of information as ‘Visiting Websites’ was presented in Figure 16.

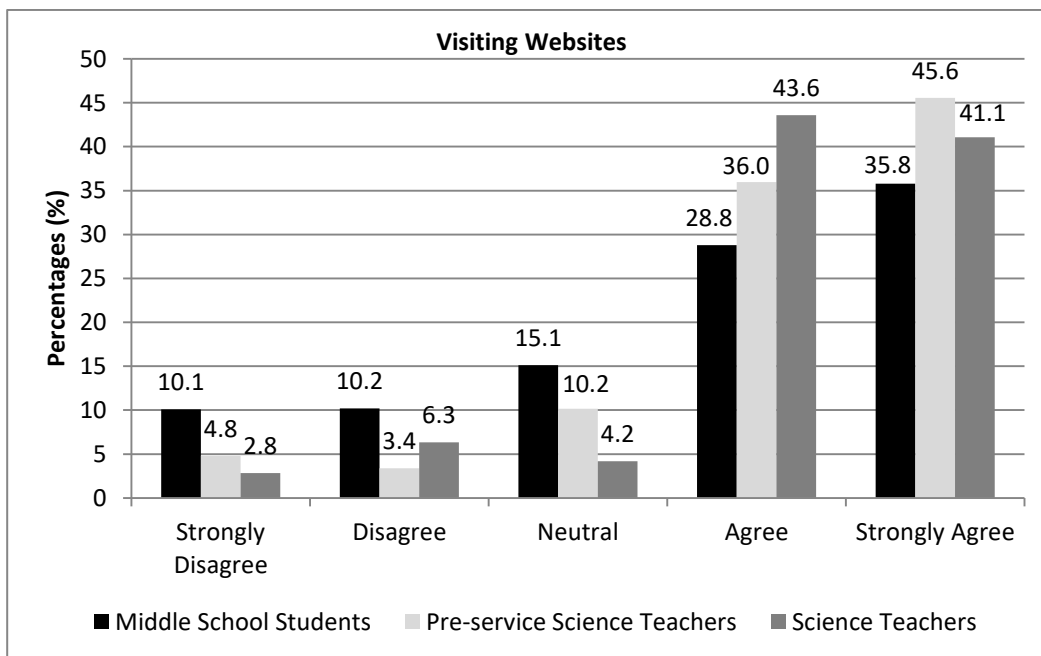


Figure 16. Frequency distribution related to source of information as ‘Visiting Websites’

According to Figure 16, more than half of middle school students (64.6%) and more than three quarters of pre-service science teachers (81.5%) and science teachers (84.6%) stated that they use ‘Visiting Websites’ as a source of information related to environmental issues. However, less than quarter of middle school students (20.3%) and less than one-tenth of pre-service science teachers (8.2%) and one-tenth of science teachers (9.2%) stated that they don’t use visiting websites as source of information. Frequency distribution related to source of information as ‘Television / Radio Programs’ was presented in Figure 17.

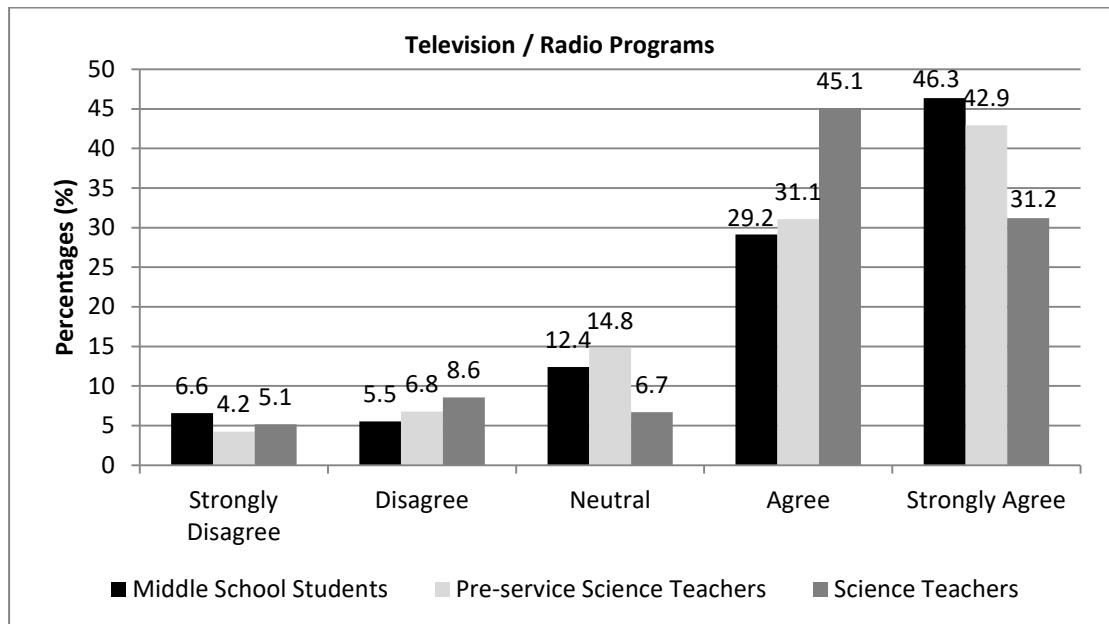


Figure 17. Frequency distribution related to source of information as ‘Television / Radio Programs’

According to Figure 17, three quarters of middle school students (75.5%), pre-service science teachers (74%) and science teachers (76.3%) stated that they use ‘Television / Radio Programs’ as a source of information related to environmental issues. However, less than one sixth of middle school students (12.1%) pre-service science teachers (11%) and science teachers (13.7%) stated that they don’t use television / radio programs as source of information. Distribution related to source of information as ‘Participating in Voluntary Work on the Environment’ was presented in Figure 18. According to Figure 18, more than quarters of middle school students (33.2%), pre-service science teachers (27.8%) and science teachers (36.4%) stated that they use ‘Participating in Voluntary Work on the Environment’ as a source of information related to environmental issues. However, almost half of middle school students (44.7%) and pre-service science teachers (46.4%) and more than quarters of science teachers (35.1%) stated that they don’t use participating in voluntary work on the environment as source of information.

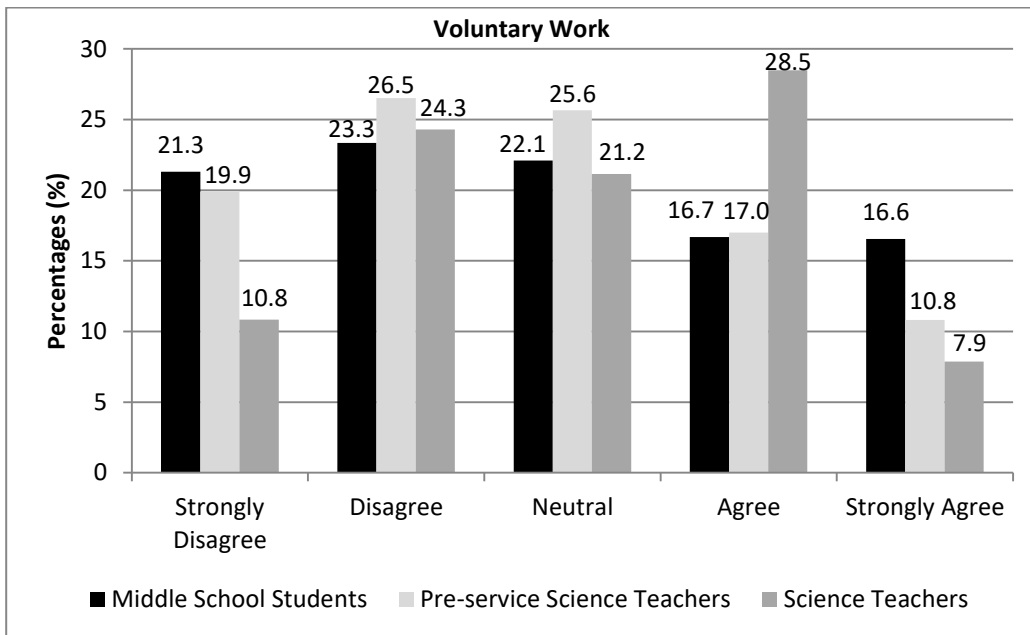


Figure 18. Frequency distribution related to source of information as ‘Participating in Voluntary Work on the Environment’

Frequency distribution related to source of information as ‘From Textbooks’ was presented in Figure 19. More than half of middle school students (60.7%), pre-service science teachers (65.8%) and science teachers (53.3%) stated that they use ‘From Textbooks’ as a source of information related to environmental issues.

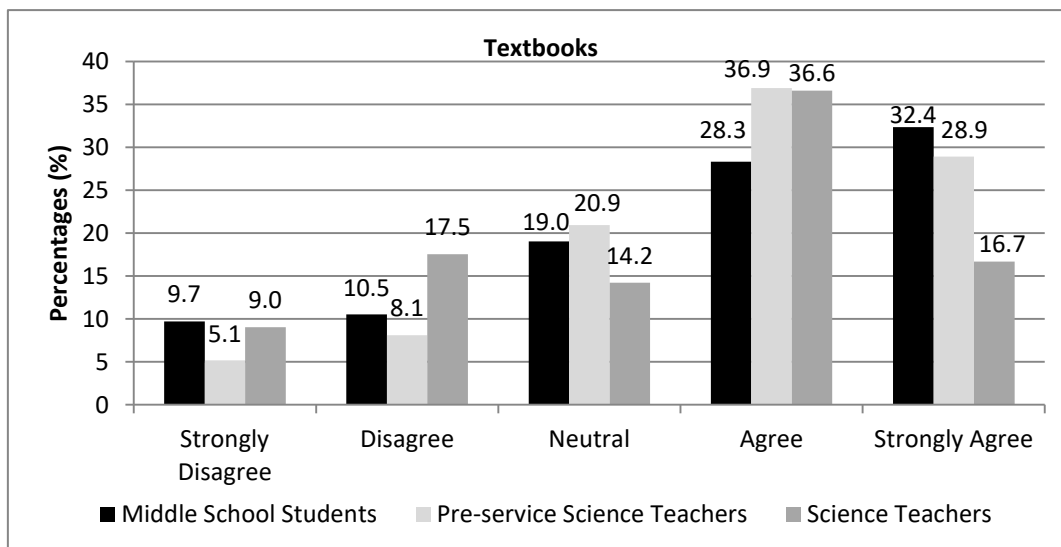


Figure 19. Frequency distribution related to source of information as ‘From Textbooks’

According to Figure 19, However, less than quarter of middle school students (20.2%), pre-service science teachers (13.2%) and science teachers (26.6%) stated that they don't use Textbooks as source of information. Frequency distribution related to source of information as 'From Friends' was presented in Figure 20.

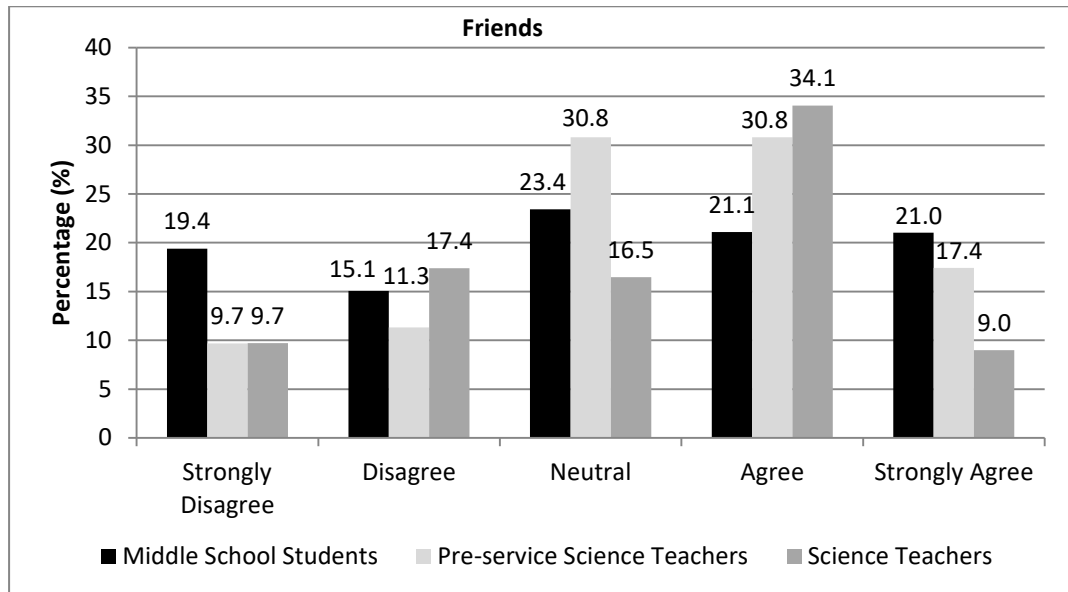


Figure 20. Frequency distribution related to source of information as 'From Friends'

According to Figure 20, almost half of middle school students (42.1%), pre-service science teachers (48.2%) and science teachers (43%) stated that they use 'From Friends' as a source of information related to environmental issues. However, quarter of middle school students (34.5%), pre-service science teachers (21%) and science teachers (27.1%) stated that they don't obtain information from their friends Textbooks as source of information.

4.2.2. Ecological Worldviews

In the research questions, investigating middle school students' pre-service science teachers' and science teachers' ecological worldview beliefs is aimed. Therefore, in this section analysis toward this aim are involved. The descriptive

statistics including mean scores and standard deviations related to the three sample group were indicated in Table 37.

Table 37. Mean Scores and Standard Deviations of Human Based and Nature Based Views with Sample Group

Sample Group	Human Based		Nature Based	
	M	SD	M	SD
Middle School Students	3.16	1.33	3.82	1.14
Pre-Service Science Teacher	3.65	1.12	3.93	.97
Science Teacher	3.81	1.23	3.95	1.05
TOTAL	3.54	1.23	3.91	1.05

As presented in the Table 37, middle school students' responses produced a mean score of 3.16 ($SD=1.33$) for human based views and 3.82 ($SD=1.14$) for nature based views. A mean score of pre-service science teachers is 3.65 ($SD=1.12$) for human based views and is 3.93 ($SD=.97$) for nature based views. Lastly, science teachers' mean score for human based views is 3.81 ($SD=1.23$) and for nature based views is 3.97 ($SD=1.05$). These results showed all of three sample groups exhibited more nature based views than human based views. In addition, when comparing the nature based views among the sample, it is seen that the views from highest to lowest belong to the science teachers, pre-service science teachers and students, respectively.

4.2.2.1. Ecological Worldviews of Middle School Students

In this section, descriptive statistics results and frequency distributions of ecological worldviews of middle school students related to demographic characteristics including grade level, gender and hometown are involved. Mean values and standard deviations of ecological worldviews of middle school students in terms of gender and grade level are involved in Table 38.

Table 38. Mean Values and Standard Deviations Ecological Worldviews of Students in terms of Gender and Grade Level

Grade Level	Gender	Human Based		Nature Based	
		M	SD	M	SD
5th Grade	Female	3.25	.76	3.77	.56
	Male	3.09	.90	3.80	.68
	Total	3.17	.83	3.78	.62
6th Grade	Female	3.25	.77	3.77	.60
	Male	3.05	.81	3.80	.61
	Total	3.15	.79	3.79	.60
7th Grade	Female	3.25	.77	3.82	.55
	Male	2.95	.89	3.85	.63
	Total	3.10	.83	3.84	.59
8th Grade	Female	3.29	.84	3.80	.57
	Male	3.13	.90	3.86	.65
	Total	3.21	.87	3.83	.61
TOTAL		3.16	.83	3.81	.61

As presented in the Table 38, middle school students' responses obtained a mean score of 3.16 ($SD=.83$) for human based views, and 3.81 ($SD=.61$) for nature based views. In addition, human based views were engaged mostly by female middle school students for all of the grade levels including fifth ($M=3.25$, $SD=.76$), sixth ($M=3.25$, $SD=.77$), seventh ($M=3.25$, $SD=.77$) and eight grade ($M=3.29$, $SD=.84$). However, male students from for the entire grade levels including fifth ($M=3.80$, $SD=.68$), sixth ($M=3.80$, $SD=.61$), seventh ($M=3.85$, $SD=.63$) and eight grade ($M=3.86$, $SD=.65$) got the highest mean score about nature based views. These results revealed that middle school students tend to have more positive views toward nature based than human based views. Considering the findings in terms of gender (Figure 21), it was obtained that female middle school students had higher scores on human based views. Female

middle school students had a mean score as 3.27 ($SD=.80$) while male students' mean scores was 3.05 ($SD=.88$). In addition, male students ($M=3.86$, $SD=.64$) got moderately higher mean score of nature based view than females ($M=3.82$, $SD=.57$).

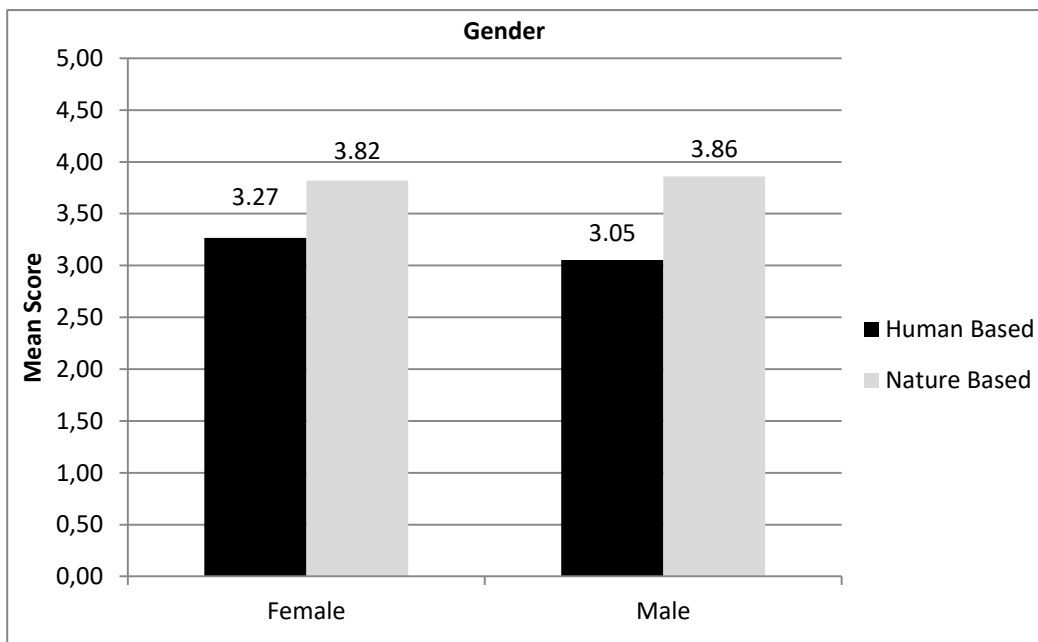


Figure 21. Mean scores of middle school students' human based and nature based views in terms of gender

Regarding hometown, mean scores of middle school students' nature based views were found to be higher than those of human based views. Participants, who live in town had higher tendency to exhibit moderately more nature based views ($M=3.94$, $SD=.69$) than those living in district ($M=3.85$, $SD=.58$), city center ($M=3.82$, $SD=.61$) and village ($M=3.82$, $SD=.57$). In Parallel to the previous results, participants from district ($M=3.22$, $SD=.82$) tended to endorse moderately more human based views compared to participants raised in city center ($M=3.16$, $SD=.85$), town ($M=2.90$, $SD=.88$) and village ($M=2.96$, $SD=.81$). Thus, it can be said that ecological worldviews tends to change as a function of hometown. Figure 22 indicated a clear picture with mean scores of human based and nature based views with respect to hometown of the middle school students.

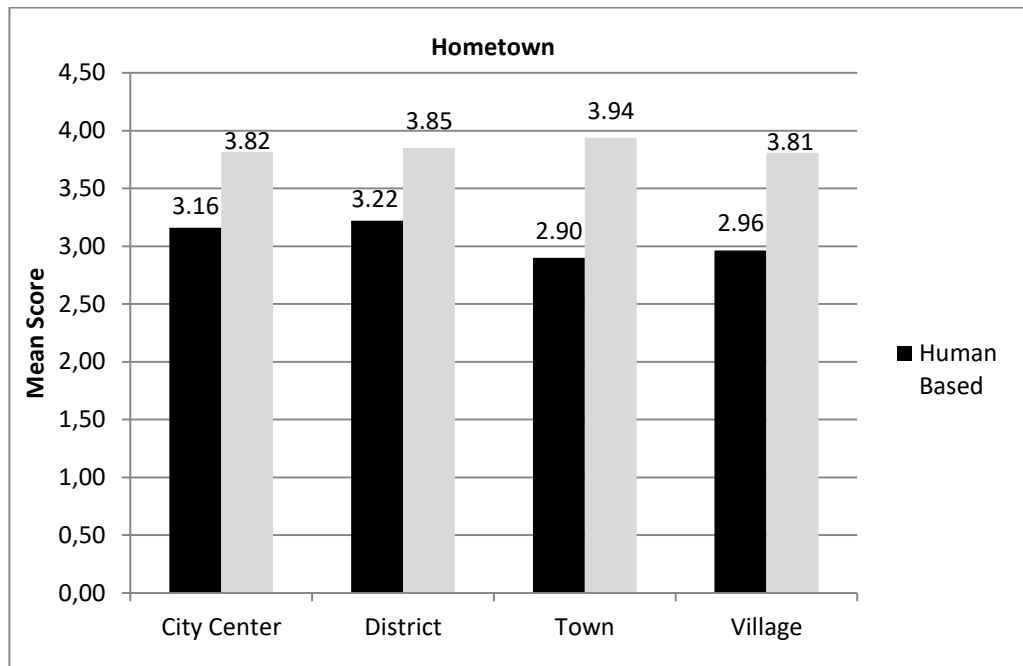


Figure 22. Mean scores of middle school students' human based and nature based views in terms of hometown

Table 39 illustrates middle school students' responses to ecological worldviews statements and corresponding item means and standard deviations. Regarding ecological worldviews of middle school students, there were 13 five-point likert type items and among them, five items are included in 'Human Based' factor, while eight items are included in 'Nature Based' factor.

Table 39. Frequency distributions of middle school students' responses to factors of ecological worldviews statements and corresponding item means and standard deviations

Factors	Items	Percentage					Item	Item
		SD	D	U	A	SA	M	SD
Human Based	Humans have the right to modify the natural environment to suit their needs.*	36.5	17.4	16.7	11.5	16.8	3.45	1.49
	Human ingenuity will insure that we do not make the earth unlivable.*	22.5	19.2	29	12.5	14.2	3.23	1.32
	The balance of nature is strong enough to cope with the impacts of modern industrial nations.*	9.3	9	39.4	18.2	19.9	2.71	1.17

Table 39. (Continued)

	The so-called “ecological crisis” facing humankind has been greatly exaggerated.*	17	16.5	33.9	15.3	14.6	3.06	1.26
	Humans were meant to rule over the rest of nature.*	31.3	16.5	20.4	12.3	15.5	3.34	1.43
	Total Scale						3.16	1.33
Nature Based	When humans interfere with nature it often produces disastrous consequences.	8.8	11.9	27.9	22.9	26.7	3.48	1.24
	Humans are severely abusing the environment.	5.9	6.4	14.1	24.8	45.7	4.01	1.18
	Plants and animals have as much right as humans to exist.	2.4	2.2	6.6	14	72.3	4.56	0.89
	Despite our special abilities humans are still subject to the laws of nature.	7.1	6.9	27.2	24.8	30.9	3.68	1.18
	The earth is like a spaceship with very limited room and resources.	10.7	11.5	28.5	22.5	23.2	3.37	1.25
	The balance of nature is very delicate and easily upset.	6.4	7.8	19.4	26	36.5	3.81	1.19
	If things continue on their present course, we will soon experience a major ecological catastrophe.	4	4.3	18.9	23.1	46.6	4.07	1.09
	We are approaching the limit of the number of people the earth can support.	4.9	5.9	37.4	20.8	25	3.59	1.07
	Total Scale						3.82	1.14

Note: SD: Strongly disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly agree, M: Mean, SD: Standard deviation, *Items were reverse coded

The mean score on ‘Human Based’ factor was calculated as 3.16 with a standard deviation 1.33, while the mean score on ‘Nature Based’ factor was calculated as 3.82 with a standard deviation 1.14. Considering items in terms of ‘Human Based’, most of middle school students (53.9%) believe that humans don’t have the right to modify the natural environment to suit their needs. Almost half of them (41.7%) believe that human ingenuity will insure that we do not make the earth unliveable. 38.1% of them believe that the balance of nature is strong enough to cope with the impacts of modern industrial nations and one third of believe that the so-called “ecological crisis” facing humankind has been greatly

exaggerated (30%). Almost half of them don't think that humans were meant to rule over the rest of nature (48 %). Students' responses on 'Nature Based' are as followed. Almost half of them (49.60%) believe that when humans interfere with nature it often produces disastrous consequences. Almost three quarters of middle school students' (70.5%) believe that humans are severely abusing the environment. Many of them (86.30%) think that plants and animals have as much right as humans to exist.

More than half of them (55.70%) believe that humans are still subject to the laws of nature, despite our special abilities. Almost half of them believe that the earth is like a spaceship with very limited room and resources (46%). More than half of them (63%) think that the balance of nature is very delicate and easily upset. In addition, a vast majority of them (69.70%) think that if things continue on their present course, we will soon experience a major ecological catastrophe. While almost half of them (45.8%) think that we are approaching the limit of the number of people the earth can support, a considerable amount (37.4%) of them are neutral about this item.

4.2.2.2. Ecological Worldviews of Pre-Service Science Teachers

In this section, items and total mean scores, standard deviations and frequency distributions of ecological worldviews of pre-service science teachers with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of ecological worldviews of pre-service science teachers with respect to gender and grade level are involved in Table 40. As presented in the Table 40, pre-service science teachers' responses produced a mean score of 3.65 ($SD=.72$) for human based views and 3.89 ($SD=.52$) for nature based views. In addition, human based views were engaged mostly by female middle school students for three grade levels including first ($M=3.71$, $SD=.65$), third ($M=3.83$, $SD=.64$), and fourth grade ($M=3.69$, $SD=.75$). On the other hand, male participants from for three grade levels including first

($M=4.02$, $SD=.62$), second ($M=3.88$, $SD=.40$), and third grade ($M=4.03$, $SD=.45$) got the highest mean score regarding nature based views.

Table 40. Mean scores and standard deviations ecological worldviews of pre-service science teachers with respect to gender and grade level.

Grade Level	Gender	Human Based		Nature Based	
		M	SD	M	SD
1 st Grade	Male	3.67	.67	4.02	.62
	Female	3.71	.65	3.82	.45
	Total	3.70	.65	3.84	.48
2 nd Grade	Male	3.51	.78	3.88	.40
	Female	3.47	.71	3.87	.55
	Total	3.48	.72	3.87	.53
3 rd Grade	Male	3.63	.73	4.03	.45
	Female	3.83	.64	3.92	.56
	Total	3.80	.66	3.94	.55
4 th Grade	Male	3.18	.87	3.84	.39
	Female	3.69	.75	3.90	.52
	Total	3.65	.77	3.89	.51
TOTAL		3.65	.72	3.89	.52

These results revealed that pre-service science teachers tend to have more positive views toward nature based than human based views. When responses were examined with respect to gender (Figure 23), it was found that female pre-service science teachers had higher scores on human based views. Female pre-service science teachers had a mean score as 3.67 ($SD=.71$) while males' mean score was 3.50 ($SD=.77$). On the other hand, male participants ($M=3.94$, $SD=.47$) got moderately higher mean score of nature based view than females ($M=3.88$, $SD=.53$). Regarding hometown, mean scores of pre-service science teachers' nature based views were found to be higher than those of human based views. Participants, who live in village ($M=3.91$, $SD=.56$ and city center ($M=3.91$, $SD=.53$) had higher tendency to exhibit moderately more nature based views than those living in district ($M=3.88$, $SD=.47$), and town ($M=3.72$, $SD=.45$).

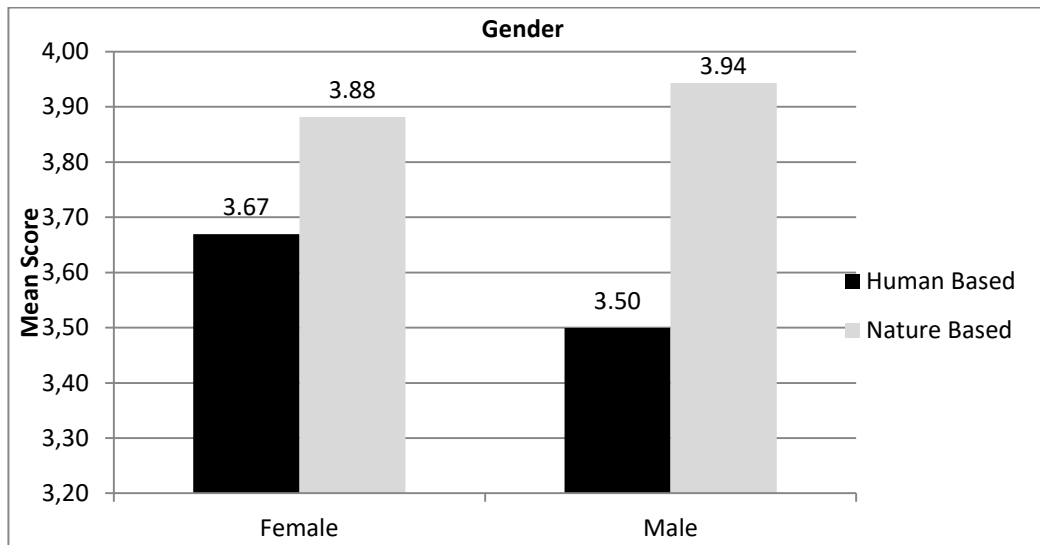


Figure 23. Mean scores of pre-service science teachers' human based and nature based views in terms of gender

In parallel to the previous results, participants from city center ($M=3.65$, $SD=.72$) and district ($M=3.65$, $SD=.72$) tended to endorse moderately more human based views compared to participants raised in village ($M=3.64$, $SD=.71$) and town ($M=3.58$, $SD=.67$). Figure 24 indicated a clear picture with mean scores of human based and nature based views with respect to hometown of the pre-service science teachers.

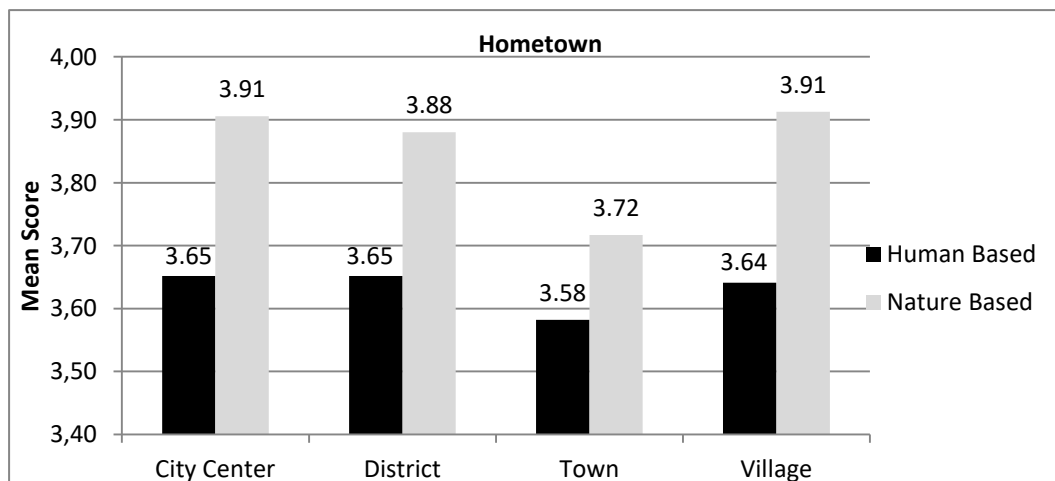


Figure 24. Mean scores of pre-service science teachers' human based and nature based views in terms of hometown

Table 41 illustrates pre-service science teachers' responses to ecological worldviews statements and corresponding item means and standard deviations.

Table 41. Frequency distributions of pre-service science teachers' responses to ecological worldviews statements and corresponding item means and standard deviations

Factors	Items	Percentage					Item	Item
		SD	D	U	A	SA	M	SD
Human Based	Humans have the right to modify the natural environment to suit their needs.*	33.1	32.9	19.6	9.1	5	3.80	1.14
	Human ingenuity will insure that we do not make the earth unlivable.*	33.6	33.8	20.7	6.9	4	3.85	1.09
	The balance of nature is strong enough to cope with the impacts of modern industrial nations.*	8.1	15.7	37	23.3	14.4	2.80	1.12
	The so-called "ecological crisis" facing humankind has been greatly exaggerated.*	32.2	40.3	16.4	7.5	3.2	3.91	1.04
	Humans were meant to rule over the rest of nature.*	41.9	26.8	14.9	9.5	5.7	3.89	1.22
	Total Scale						3.65	1.12
Nature Based	When humans interfere with nature it often produces disastrous consequences.	3.6	15.1	28.6	34.8	17.3	3.47	1.05
	Humans are severely abusing the environment.	2.8	5.5	12.8	40.9	35.6	4.04	0.98
	Plants and animals have as much right as humans to exist.	1.5	2.1	4.6	15.7	75.4	4.63	0.79
	Table 41. (continued)							
	Despite our special abilities humans are still subject to the laws of nature.	5.5	12.2	27.2	33	21.3	3.53	1.12
	The earth is like a spaceship with very limited room and resources.	5.8	13.4	30.1	33.6	16.4	3.42	1.09
	The balance of nature is very delicate and easily upset.	3	10.5	17.8	36.7	30.5	3.82	1.07
	If things continue on their present course, we will soon experience a major ecological catastrophe.	0.8	1.9	11	37.2	48.6	4.31	0.81
	We are approaching the limit of the number of people the earth can support.	1.8	4.3	25.7	38.7	28.9	3.89	0.93
	Total Scale						3.93	.97

Note. SD: Strongly disagree. D: Disagree. U: Undecided. A: Agree. SA: Strongly agree. M: Mean. SD: Standard deviation, *Items were reverse coded

Regarding ecological worldviews of pre-service science teachers, there were 13 five-point likert type items and among them, five items are included in 'Human Based' factor, while eight items are included in 'Nature Based' factor (see Table 41). The mean score on 'Human Based' factor was calculated as 3.65 with a standard deviation 1.12, while the mean score on 'Nature Based' factor was calculated as 3.93 with a standard deviation .97. Considering items in terms of 'Human Based', most of pre-service science teachers (66%) believe that humans don't have the right to modify the natural environment to suit their needs. An important number of them (67.4%) agree that human ingenuity will insure that we do not make the earth unlivable. However, in some items they are neutral considerably. For example, the balance of nature is strong enough to cope with the impacts of modern industrial nations (37 %). Many of the pre-service science teachers (72.5%) don't believe that the so-called 'ecological crisis' facing humankind has been greatly exaggerated and many of them don't think that humans were meant to rule over the rest of nature (68.7 %). Pre-service science teachers' responses on 'Nature Based' are as followed. More than half of them (52.1 %) believe that when humans interfere with nature it often produces disastrous consequences. Three quarters of pre-service science teachers' (76.5%) believe that humans are severely abusing the environment. A great majority of them (91.1%) think that plants and animals have as much right as humans to exist. More than half of them (54.30%) believe that humans are still subject to the laws of nature. despite our special abilities. Half of them believe that the earth is like a spaceship with very limited room and resources (50%). More than half of them (63%) think that the balance of nature is very delicate and easily upset. A vast majority of them (85.80%) think that if things continue on their present course, we will soon experience a major ecological catastrophe. While more than half of them (67.6%) think that we are approaching the limit of the number of people the earth can support.

4.2.2.3. Ecological Worldviews of Science Teachers

Data collected related to ecological worldviews of science teachers were presented in this section. Mean scores and standard deviations of ecological worldviews of science teachers with respect to gender are involved in Table 42.

Table 42. Mean scores and standard deviations ecological worldviews of science teachers with respect to gender and grade level.

Gender	Human Based		Nature Based	
	M	SD	M	SD
Male	3.78	.88	3.92	.62
Female	3.83	.76	3.96	.55
Total	3.81	.81	3.95	.57

As presented in the Table 42, ecological worldviews were engaged mostly by female science teachers for both human based views ($M=3.83$, $SD=.76$) and nature based views ($M=3.96$, $SD=.55$) than males' human based views ($M=3.78$, $SD=.88$) and nature based views ($M=3.93$, $SD=.62$). Table 43 illustrates science teachers' responses to ecological worldviews statements and item means and standard deviations. Regarding ecological worldviews of science teachers, there were 13 five-point likert type items and among them, five items are included in 'Human Based' factor, while eight items are included in 'Nature Based' factor.

Table 43. Frequency distributions of science teachers' responses to ecological worldviews statements and corresponding item means and standard deviations

Factors	Items	Percentage					Item	Item
		SD	D	U	A	SA	M	SD
Human Based	Humans have the right to modify the natural environment to suit their needs.*	46.9	29.5	7.7	9.5	5.8	4.00	1.24
	Human ingenuity will insure that we do not make the earth unlivable.*	41.4	29.6	12.6	10.3	5	3.90	1.23

Table 43. (Continued)

	The balance of nature is strong enough to cope with the impacts of modern industrial nations.*	23.3	30.6	15.8	18.1	11	3.36	1.33
	The so-called “ecological crisis” facing humankind has been greatly exaggerated.*	34.6	43.3	10.5	6.2	4.3	3.95	1.10
	Humans were meant to rule over the rest of nature.*	38.4	32.4	10.3	13.5	3	3.84	1.25
	Total Scale						3.81	1.23
Nature Based	When humans interfere with nature it often produces disastrous consequences.	4.7	13.3	15.1	38.3	28.1	3.72	1.15
	Humans are severely abusing the environment.	7.3	4.3	3.5	39.9	42.1	4.06	1.17
	Plants and animals have as much right as humans to exist.	.8	1.2	1.3	20.6	75.2	4.68	0.69
	Despite our special abilities humans are still subject to the laws of nature.	7.5	12.5	16.8	41.3	20	3.51	1.22
	The earth is like a spaceship with very limited room and resources.	6.5	13.6	14.5	40.4	23.1	3.56	1.24
	The balance of nature is very delicate and easily upset.	5.7	8	11.8	38.1	31.6	3.80	1.22
	If things continue on their present course, we will soon experience a major ecological catastrophe.	1.7	2.5	6.5	37.8	50.9	4.32	0.91
	We are approaching the limit of the number of people the earth can support.	2	5.5	17	44.1	30.3	3.94	0.99
	Total Scale							3.95

Note. SD: Strongly disagree. D: Disagree. U: Undecided. A: Agree. SA: Strongly agree. M: Mean. SD: Standard deviation *Items were reverse coded

The mean score on ‘Human Based’ factor was calculated as 3.81 with a standard deviation 1.23, while the mean score on ‘Nature Based’ factor was calculated as 3.97 with a standard deviation 1.05. Considering items in terms of ‘Human Based’, most of science teachers (76.4%) believe that humans don’t have the right to modify the natural environment to suit their needs. An important number of them (71%) agree that human ingenuity will insure that we do not make the earth unliveable. More than half of them (53.9 %) don’t believe that the balance of nature is strong enough to cope with the impacts of modern industrial nations.

Many of the science teachers (77.9%) don't believe that the so-called "ecological crisis" facing humankind has been greatly exaggerated. Many of them don't think that humans were meant to rule over the rest of nature (70.8%). Science teachers' responses on 'Nature Based' are as followed. More than half of them (66.4%) believe that when humans interfere with nature it often produces disastrous consequences. More than three quarters of science teachers believe that humans are severely abusing the environment (82%). A great majority of them (95.8%) think that plants and animals have as much right as humans to exist. More than half of them (61.30%) believe that humans are still subject to the laws of nature, despite our special abilities. More than half of them believe that the earth is like a spaceship with very limited room and resources (63.5%). More than half of them (69.7%) think that the balance of nature is very delicate and easily upset. A vast majority of them (88.70%) think that if things continue on their present course, we will soon experience a major ecological catastrophe. While more than half of them (74.4%) think that we are approaching the limit of the number of people the earth can support.

4.2.3. Fundamental Values

In the first research question, investigating middle school students' pre-service science teachers' and science teachers' fundamental values is aimed. Therefore, in this section analysis toward this aim are involved. The descriptive statistics involving mean scores and standard deviations of with respect to the three sample group were indicated in Table 44. Middle school students' responses produced a mean score of 3.40 ($SD=.87$) for egoistic value, 4.42 ($SD=.69$) for altruistic value and 4.47 ($SD=.62$) for biospheric value. A mean score of pre-service science teachers is 3.61 ($SD=.78$) for egoistic value, 4.58 ($SD=.51$) for altruistic value and 4.60 ($SD=.47$) for biospheric value. Lastly, science teachers' mean score is 3.46 ($SD=.71$) for egoistic value, 4.52 ($SD=.48$) for altruistic value and 4.64 ($SD=.44$) for biospheric value.

Table 44. Mean scores and standard deviations of fundamental values with sample group

Sample Group	Egoistic		Altruistic		Biospheric	
	M	SD	M	SD	M	SD
Middle School Students	3.40	.87	4.42	.69	4.47	.62
Pre-Service Science Teacher	3.61	.78	4.58	.51	4.60	.47
Science Teacher	3.46	.71	4.52	.48	4.64	.44
TOTAL	3.44	.84	4.45	.64	4.51	.58

These results showed that mean score of biospheric ($M=4.51$, $SD=.58$) is the highest value and mean score of altruistic value ($M=4.45$, $SD=.64$) is higher than mean score of egoistic value ($M=3.44$, $SD=.84$) for three sample group. In addition, when comparing the in terms of sample group, it is seen that the mean score of pre-service science teachers is highest value for egoistic and altruistic value, while the mean score of science teachers is highest value for biospheric value.

4.2.3.1. Fundamental Values of Middle School Students

In this section, items and total mean scores, standard deviations and frequency distributions of fundamental values of middle school students with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of fundamental values of middle school students with respect to gender and grade level are involved in Table 45.

Table 45. Mean scores and standard deviations for fundamental values of middle school students with respect to gender and grade level.

Grade Level	Gender	Egoistic		Altruistic		Biospheric	
		M	SD	M	SD	M	SD
5th Grade	Female	3.23	.91	4.44	.63	4.56	.51
	Male	3.40	.91	4.29	.84	4.42	.57
6th Grade	Female	3.23	.80	4.48	.61	4.55	.51
	Male	3.31	.94	4.38	.74	4.41	.70

Table 45. (Continued)

7th Grade	Female	3.27	.85	4.58	.50	4.59	.48
	Male	3.53	.88	4.28	.77	4.34	.72
8th Grade	Female	3.40	.83	4.51	.60	4.53	.56
	Male	3.57	.82	4.36	.75	4.39	.70
TOTAL		3.40	.87	4.42	.69	4.47	.62

As presented in the Table 45, middle school students' responses produced a mean score of 3.40 ($SD=.87$) for egoistic value, 4.42 ($SD=.69$) for altruistic value and 4.47 ($SD=.62$) for biospheric value. In addition, egoistic value means were engaged mostly by male middle school students for all of the grade levels including fifth ($M=3.40$, $SD=.91$), sixth ($M=3.31$, $SD=.94$), seventh ($M=3.53$, $SD=.88$) and eight grade ($M=3.57$, $SD=.82$). On the other hand, female participants from for the entire grade levels including fifth ($M=4.44$, $SD=.63$), sixth ($M=4.48$, $SD=.61$), seventh ($M=4.58$, $SD=.50$) and eight grade ($M=4.51$, $SD=.60$) got the highest mean score regarding altruistic value and for the entire grade levels including fifth ($M=4.56$, $SD=.51$), sixth ($M=4.55$, $SD=.51$), seventh ($M=4.59$, $SD=.48$) and eight grade ($M=4.53$, $SD=.56$) got the highest mean score regarding biospheric value. These results revealed that middle school students tend to have more positive views toward altruistic value and biospheric value than egoistic value. When responses were examined with respect to gender (Figure 25), it was found that female middle school students had higher scores on altruistic value and biospheric value. Female middle school students had a mean score as 4.52 ($SD=.58$) for altruistic value and 4.56 ($SD=.52$) for biospheric value while males' mean score was 4.33 ($SD=.77$) for altruistic value and 4.39 ($SD=.69$) for biospheric value. On the other hand, male participants ($M=3.49$, $SD=.88$) got moderately higher mean score of egoistic value than females ($M=3.31$, $SD=.84$).

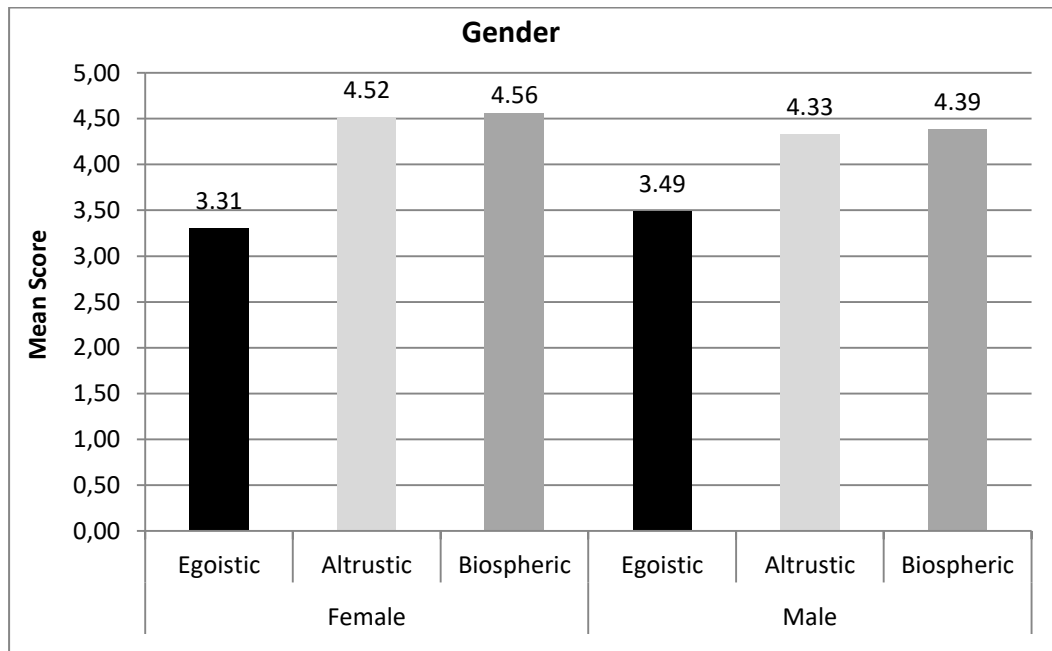


Figure 25. Mean scores of middle school students' fundamental values in terms of gender

Regarding hometown, mean scores of middle school students' biospheric values were found to be higher than those of altruistic and egoistic values. Participants, who live in district had higher tendency to exhibit moderately more biospheric values ($M=4.51$, $SD=.58$) than those living in city center ($M=4.47$, $SD=.63$), town ($M=4.44$, $SD=.53$) and village ($M=4.40$, $SD=.58$). Participants from district ($M=4.44$, $SD=.65$) and town ($M=4.44$, $SD=.67$) tended to endorse moderately more altruistic values compared to participants raised in city center ($M=4.42$, $SD=.70$) and village ($M=4.38$, $SD=.57$). In addition, participants, who live in town ($M=3.53$, $SD=.97$) had higher tendency to exhibit moderately more egoistic values than those living in city center ($M=3.42$, $SD=.86$), district ($M=3.27$, $SD=.87$) and village ($M=3.44$, $SD=.81$). Thus, it can be said that fundamental values tends to change as a function of hometown. Figure 26 indicated a clear picture with mean scores of biospheric, altruistic and egoistic values with respect to hometown of the middle school students.

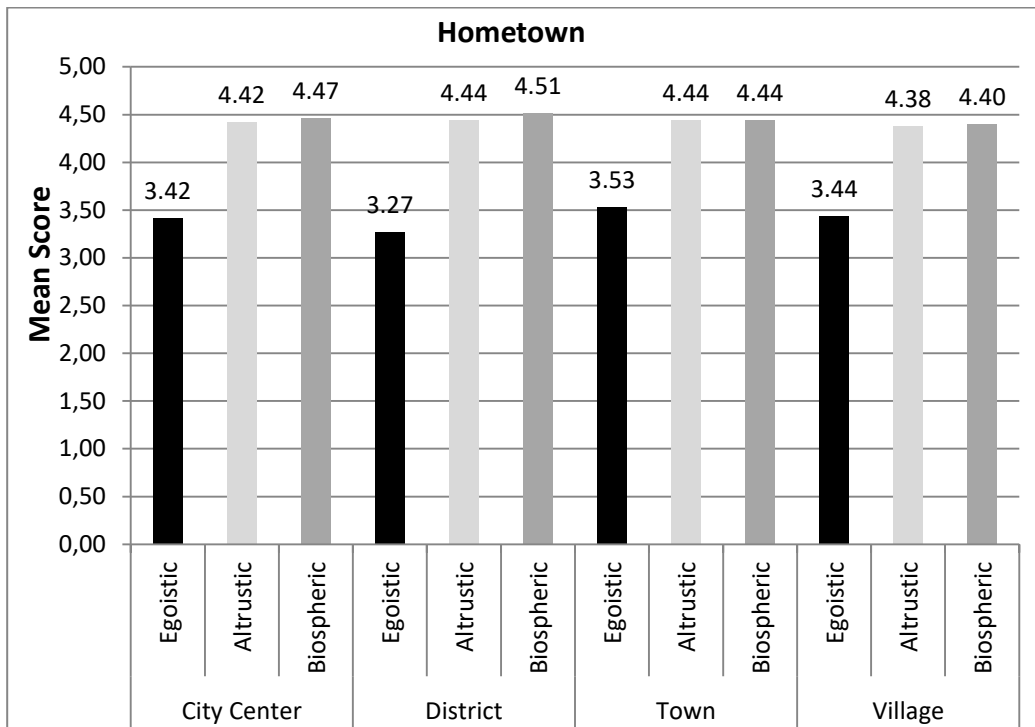


Figure 26. Mean scores of middle school students' fundamental values in terms of hometown

Table 46 illustrates middle school students' responses to fundamental value statements and corresponding item means and standard deviations. Regarding fundamental values of middle school students, it is asked from them to choose some items with a statement (*Indicate how important the following options are for you when guiding your own life*) and given some options. There were 12 five-point likert type items and among them, four items are included in 'Egoistic Value', four items are included in 'Altruistic Value' and four items are included in 'Biospheric Value'. The mean score on 'Egoistic Value' factor was calculated as 3.40 with a standard deviation 1.29, the mean score on 'Altruistic Value' factor was calculated as 4.42 with a standard deviation .94 and the mean score on 'Biospheric Value' factor was calculated as 4.47 with a standard deviation .85. Considering items in terms of 'Egoistic Value', many of middle school students (62.4%) attach importance to 'Influential', almost half of them (48.6%) put emphasis on 'Authority'.

Table 46. Frequency distributions of middle school students' responses to factors of fundamental values statements and corresponding item means and standard deviations

Factors	Items	Percentage					Item M	Item SD
		SI	I	U	NI	NAI		
Egoistic	Authority	26.7	21.9	27.5	11.5	10	3.45	1.27
	Social Power	25.7	16	21	13.9	20.4	3.13	1.46
	Wealth	19.4	21.1	24.1	19.3	13.9	3.13	1.31
	Influential	36.7	25.7	24.3	6.4	3.8	3.88	1.10
	Total Scale						3.40	1.29
Altruistic	Social Justice	64.2	18.7	9.1	2.9	2.8	4.42	0.97
	Helpful	53.6	24.8	12.7	3.4	3	4.26	1.00
	A World At Peace	73.6	12.5	7	2.1	2.5	4.56	0.90
	Equality	64.2	19.3	9	2.9	1.8	4.45	0.90
	Total Scale						4.42	0.94
Biospheric	Unity With Nature	55.9	27.2	9.8	2.9	2	4.35	0.91
	Respecting The Earth	62.4	22.9	8.6	1.9	1.5	4.47	0.84
	Protecting The Environment	68	23.3	4.7	1.1	1.2	4.58	0.74
	Preventing Pollution	66.4	18	8.1	2.5	2.3	4.48	0.91
	Total Scale						4.47	0.85

Note. SI:Supreme Importance, I: Important, U: Undecided, NI:Not Important, NAI:Not All Important, M: Mean, SD: Standard deviation

In addition, an important part of them indicated 'Social Power' (41.7%) and 'Wealth' (40.5%) as important in their life. Among 'Altruistic Value', Among 'Altruistic Value', fundamental values under this concept were evaluated as important by more than three quarter of them. For example, 86.1 % of them give importance to 'A World at Peace' and 83.5 % of them indicate 'Equality'. Among all of the middle school students, almost ninth of them place importance on 'Biospheric Value'. Unity With Nature is important for 83.1 % of them, Respecting The Earth is for 85.3 % of them, Protecting The Environment is for 91.3 % of them and Preventing Pollution is for 84.4 % of them.

4.2.3.1. Fundamental Values of Pre-Service Science Teachers

In this section, items and total mean scores, standard deviations and frequency distributions of fundamental values of pre-service science teachers with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of fundamental values of pre-service science teachers with respect to gender and grade level are involved in Table 47.

Table 47. Mean scores and standard deviations fundamental values of pre-service science teachers with respect to gender and grade level.

Grade Level	Gender	Egoistic		Altruistic		Biospheric	
		M	SD	M	SD	M	SD
1st Grade	Female	3.49	0.73	4.61	0.45	4.62	0.42
	Male	3.84	0.72	4.36	0.56	4.34	0.36
2nd Grade	Female	3.62	0.82	4.63	0.48	4.61	0.47
	Male	3.64	0.68	4.55	0.62	4.47	0.55
3th Grade	Female	3.56	0.76	4.60	0.52	4.59	0.47
	Male	3.61	0.97	4.62	0.41	4.66	0.40
4th Grade	Female	3.70	0.74	4.54	0.51	4.62	0.47
	Male	3.75	0.63	4.08	0.72	4.33	0.64
TOTAL		3.61	0.78	4.58	0.51	4.60	0.47

As presented in the Table 47, pre-service science teachers' responses produced a mean score of 3.61 ($SD=.78$) for egoistic value, 4.58 ($SD=.51$) for altruistic value and 4.60 ($SD=.47$) for biospheric value. Egoistic value means were engaged mostly by male for all of the grade levels including first ($M=3.84$, $SD=.72$), second ($M=3.64$, $SD=.68$), third ($M=3.61$, $SD=.97$) and fourth grade ($M=3.75$, $SD=.63$). On the other hand, female participants from for most of grade levels including first ($M=4.61$, $SD=.45$), second ($M=4.63$, $SD=.48$), and fourth grade ($M=4.54$, $SD=.51$) got the highest mean score regarding altruistic value and for

most of grade levels including first ($M=4.62$, $SD=.42$), second ($M=4.61$, $SD=.47$), and fourth grade ($M=4.62$, $SD=.47$) got the highest mean score regarding biospheric value. These results revealed that pre-service science teachers tend to have more positive views toward altruistic value and biospheric value than egoistic value. When responses were examined with respect to gender (Figure 27), it was found that female pre-service science teachers had higher scores on altruistic value and biospheric value. Female pre-service science teachers had a mean score as 4.59 ($SD=.50$) for altruistic value and 4.61 ($SD=.46$) for biospheric value while males' mean score was 4.47 ($SD=.59$) for altruistic value and 4.51 ($SD=.50$) for biospheric value. On the other hand, male participants ($M=3.70$, $SD=.79$) got moderately higher mean score of egoistic value than females ($M=3.60$, $SD=.77$).

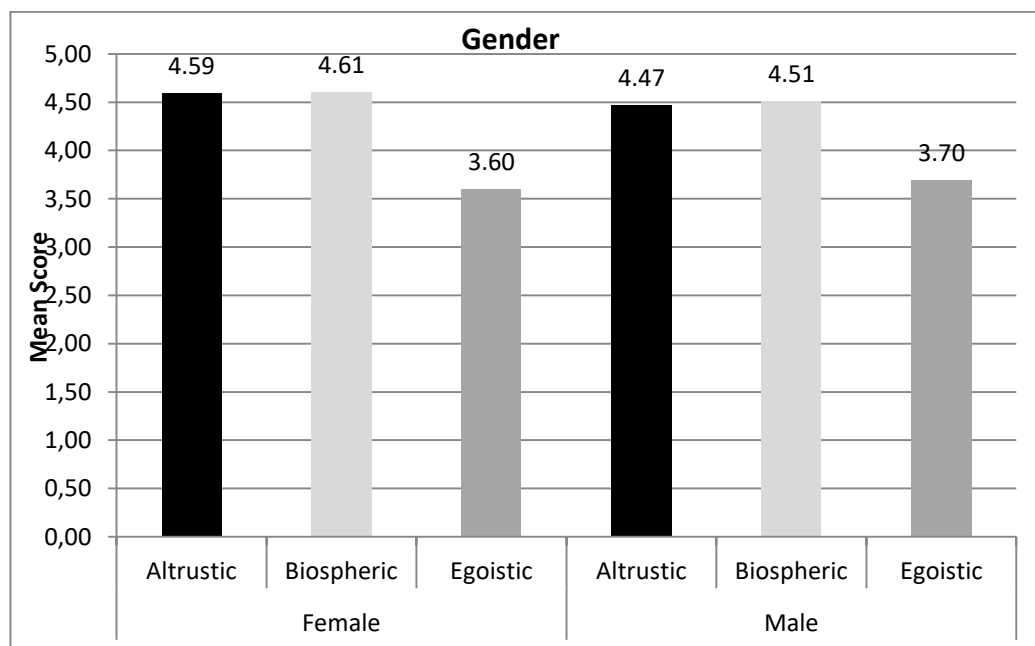


Figure 27. Mean scores of pre-service science teachers' fundamental values in terms of gender

Regarding hometown, mean scores of pre-service science teachers' biospheric values were found to be higher than those of altruistic and egoistic values. Participants, who live in city center had higher tendency to exhibit moderately more egoistic values ($M=3.65$, $SD=.79$) than those living in district ($M=3.61$,

$SD=.76$), town ($M=3.38$, $SD=.75$) and village ($M=3.53$, $SD=.75$). Participants from village ($M=4.61$, $SD=.50$) tended to endorse moderately more altruistic values compared to participants raised in city center ($M=4.60$, $SD=.49$), district ($M=4.56$, $SD=.51$) and town ($M=4.36$, $SD=.61$). In addition, participants, who live in district ($M=4.61$, $SD=.45$) and city center ($M=4.61$, $SD=.48$) had higher tendency to exhibit moderately more biospheric values than those living in town ($M=4.47$, $SD=.47$) and village ($M=4.60$, $SD=.43$). Thus, it can be said that fundamental values tends to change as a function of hometown. Figure 28 indicated a clear picture with mean scores of biospheric, altruistic and egoistic values with respect to hometown of the pre-service science teachers.

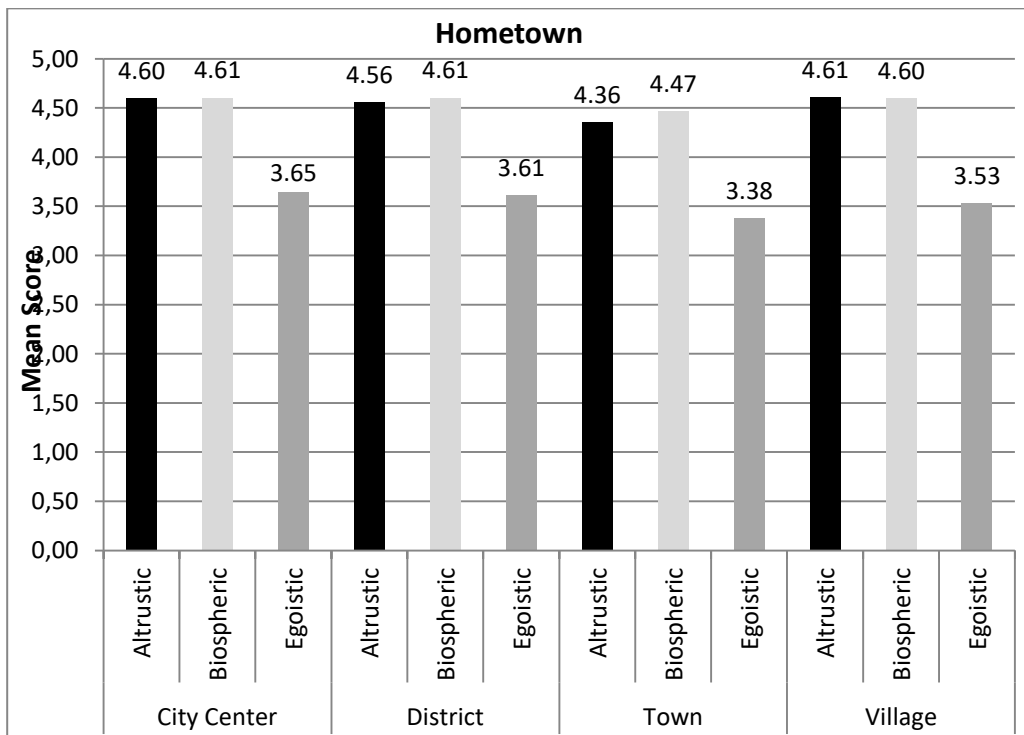


Figure 28. Mean scores of pre-service science teachers' fundamental values in terms of hometown

Table 48 illustrates pre-service science teachers' responses to fundamental values statements and corresponding item means and standard deviations. Regarding fundamental values of pre-service science teachers, it is asked from them to

choose some items with a statement (Indicate how important the following options are for you when guiding your own life) and given some options.

Table 48. Frequency distributions of pre-service science teachers' responses to fundamental values statements and corresponding item means and standard deviations

Factors	Items	Percentage					Item	Item
		SI	I	U	NI	NAI	M	SD
Egoistic	Authority	30.5	33	24	9.9	1.7	3.82	1.03
	Social Power	21.8	15.7	24.4	23.8	13.4	3.09	1.34
	Wealth	17.1	37.6	23.6	17.1	4.1	3.47	1.09
	Influential	38.4	37.4	16.4	6.5	.8	4.07	0.94
Total Scale						3.61	1.10	
Altruistic	Social Justice	68.1	25.6	4.3	1.4	.4	4.60	0.68
	Helpful	61.7	27.3	6.2	2.9	1	4.47	0.81
	A World At Peace	77.9	17.3	3.5	1	.1	4.72	0.59
	Equality	60.2	33	4.8	1.1	.4	4.52	0.68
Total Scale						4.58	0.69	
Biospheric	Unity With Nature	59.9	32.7	5.8	.8	.1	4.52	0.66
	Respecting The Earth	71.7	24.3	2.3	.8	.4	4.67	0.61
	Protecting The Environment	65.2	31.5	2.2	.6	.3	4.61	0.59
	Preventing Pollution	65.7	27.3	5.7	.8	-	4.59	0.64
Total Scale						4.60	0.63	

Not. SI:Supreme Importance, I: Important, U: Undecided, NI:Not Important, NAI:Not All Important, M: Mean, SD: Standard deviation

There were 12 five-point likert type items and among them, four items are included in 'Egoistic Value', four items are included in 'Altruistic Value' and four items are included in 'Biospheric Value' (see Table 48). The mean score on 'Egoistic Value' factor was calculated as 3.61 with a standard deviation 1.10, the mean score on 'Altruistic Value' factor was calculated as 4.58 with a standard deviation .69 and the mean score on 'Biospheric Value' factor was calculated as 4.60 with a standard deviation .63. Considering items in terms of 'Egoistic Value', many of pre-service science teachers (75.8%) attach importance to

‘Influential’, more than half of them (63.5%) put emphasis on ‘Authority’. In addition, an important part of them indicated ‘Wealth’ (54.7%) as important in their life. However, a small part of them stated that they place importance on ‘Social Power’ (37.5%). Among ‘Altristic Value’, fundamental values under this concept were evaluated as important by more than ninety percent of them. For example, 95.2 % of them give importance to ‘A World at Peace’, 93.7 % of them emphasize ‘Social Justice’ and 93.2 % of them indicate ‘Equality’ as important feature in their life. Among all of the pre-service science teachers, more than ninth of them place importance on ‘Biospheric Value’. Unity with Nature is important for 92.6 % of them, Respecting The Earth is for 96 % of them, Protecting The Environment is for 96.7 % of them and Preventing Pollution is for 93 % of them.

4.2.3.2. Fundamental Values of Science Teachers

Data collected related to fundamental values of science teachers were presented in this section. Mean scores and standard deviations of fundamental values of science teachers with respect to gender are involved in Table 49.

Table 49. Mean scores and standard deviations fundamental values of science teachers with respect to gender

Gender	Egoistic		Altristic		Biospheric	
	M	SD	M	SD	M	SD
Female	3.44	.70	4.56	.44	4.66	.38
Male	3.49	.71	4.46	.54	4.60	.53
Total	3.46	.71	4.52	.48	4.64	.44

As presented in the Table 49, Altristic Value ($M=4.56$, $SD=.44$) and Biospheric Value ($M=4.66$, $SD=.38$) were engaged mostly by female science teachers, while Egoistic Value is emphasized mainly by male science teachers ($M=3.44$, $SD=.70$). Table 50 illustrates science teachers’ responses to fundamental values statements and corresponding item means and standard deviations. Regarding

fundamental values of science teachers, it is asked from them to choose some items with a statement (Indicate how important the following options are for you when guiding your own life) and given some options.

Table 50. Frequency distributions of science teachers' responses to fundamental values statements and corresponding item means and standard deviations

Factors	Items	Percentage					Item M	Item SD
		SI	I	U	NI	NAI		
Egoistic	Authority	18	44.4	22.6	12.2	2.2	3.63	1.01
	Social Power	14.5	19.8	20.3	33.3	11.3	2.91	1.27
	Wealth	8.5	38.8	23.6	23.8	4.8	3.21	1.07
	Influential	31.3	50.6	15	2.2	.3	4.08	0.82
	Total Scale						3.46	1.04
Altruistic	Social Justice	57.2	38.9	2.7	.2	.7	4.51	0.68
	Helpful	52.7	39.9	5.5	.7	-	4.44	0.70
	A World At Peace	76	21.5	1.8	.3	.3	4.72	0.57
	Equality	50.7	42.4	4.5	2	-	4.41	0.72
	Total Scale						4.52	0.67
Biospheric	Unity With Nature	59.2	38.4	1.8	.3	.2	4.56	0.58
	Respecting The Earth	70.2	27.8	1.3	-	-	4.69	0.52
	Protecting The Environment	70.9	26.8	1.7	.5	-	4.68	0.56
	Preventing Pollution	67.6	29.6	2.2	.3	-	4.63	0.60
	Total Scale						4.64	0.57

Note. SI:Supreme Importance, I: Important, U: Undecided, NI:Not Important, NAI:Not All Important, M: Mean, SD: Standard deviation

There were 12 five-point likert type items and among them, four items are included in 'Egoistic Value', four items are included in 'Altruistic Value' and four items are included in 'Biospheric Value' (see Table 50). The mean score on 'Egoistic Value' factor was calculated as 3.46 with a standard deviation 1.04, the mean score on 'Altruistic Value' factor was calculated as 4.52 with a standard deviation .67 and the mean score on 'Biospheric Value' factor was calculated as 4.64 with a standard deviation .57. Considering items in terms of 'Egoistic

Value’, many of science teachers (81.9%) attach importance to ‘Influential’, more than half of them (62.4%) put emphasis on ‘Authority’. In addition, an important part of them indicated ‘Wealth’ (47.3%) as important in their life. However, a small part of them stated that they place importance on ‘Social Power’ (34.3%). Among ‘Altristic Value’, fundamental values under this concept were evaluated as important by more than ninety percent of them. For example, 97.5 % of them give importance to ‘A World at Peace’, 96.1 % of them emphasize ‘Social Justice’ and 93.1 % of them indicate ‘Equality’ as important feature in their life. Among all of the science teachers, almost all of them place importance on ‘Biospheric Value’. ‘Unity with Nature’ is important for 97.6 % of them, ‘Respecting the Earth’ is for 98 % of them, ‘Protecting the Environment’ is for 97.7 % of them and ‘Preventing Pollution’ is for 97.2 % of them.

4.2.4. Personal Norms

In the first research question, investigating middle school students’ pre-service science teachers’ and science teachers’ personal norms is aimed. Therefore, in this section analysis toward this aim are involved. The descriptive statistics involving mean scores and standard deviations of with respect to the three sample group were indicated in Table 51.

Table 51. Mean scores and standard deviations of personal norms with sample group

Sample	M	SD
Middle School Students	4.19	.65
Pre-Service Science Teacher	4.45	.49
Science Teacher	4.51	.45
TOTAL	4.27	.62

As presented in the Table 51, middle school students’ responses produced a mean score of 4.19 ($SD=.65$), the mean value of pre-service science teachers’ personal norms is 4.45 ($SD=.49$) and the mean value of science teachers’ personal norms is

4.51 ($SD=.45$). These results showed that science teachers have higher personal norm value than pre-service science teachers and middle school students.

4.2.4.1. Personal Norms of Middle School Students

In this section, items and total mean scores, standard deviations and frequency distributions of personal norms of middle school students with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of personal norms of middle school students with respect to gender and grade level are involved in Table 52.

Table 52. Mean scores and standard deviations for personal norms of middle school students with respect to gender and grade level

Grade	Gender	M	SD
5th Grade	Female	4.27	.54
	Male	4.19	.63
6th Grade	Female	4.18	.65
	Male	4.19	.67
7th Grade	Female	4.24	.58
	Male	4.10	.73
8th Grade	Female	4.26	.62
	Male	4.15	.70
TOTAL		4.19	.65

Personal norm means were engaged mostly by female middle school students at fifth ($M=4.27$, $SD=.54$), seventh ($M=4.24$, $SD=.58$) and eight grade ($M=4.26$, $SD=.62$). However, the means value of males are also high at fifth ($M=4.19$, $SD=.63$), sixth ($M=4.19$, $SD=.67$), seventh ($M=4.10$, $SD=.73$) and eight grade ($M=4.15$, $SD=.70$). When responses were examined with respect to gender

(Figure 29), it was found that female middle school students' scores on personal norm is 4.24, while the mean value of males on personal norm is 4.15.

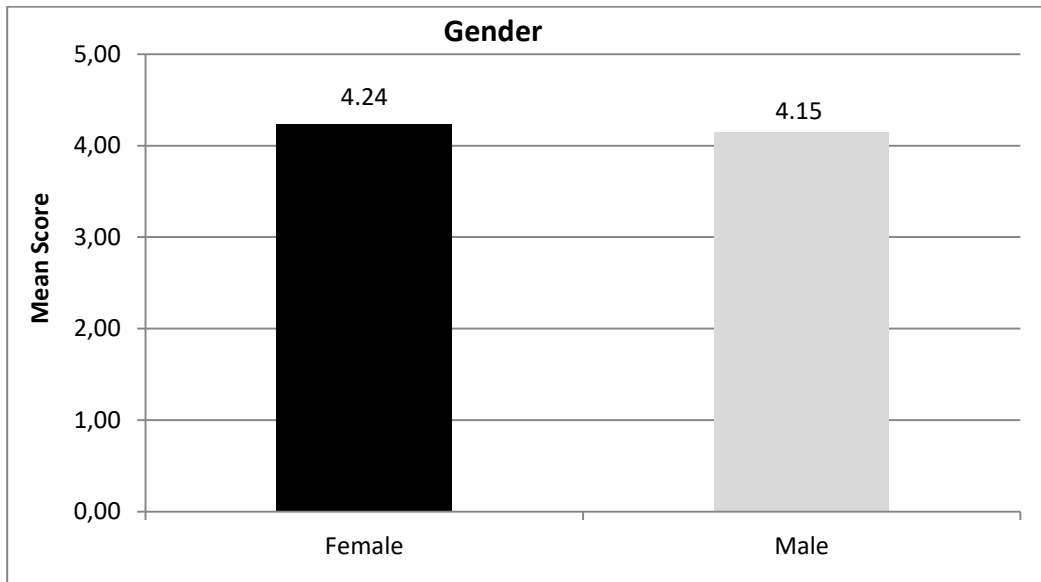


Figure 29. Mean scores of middle school students' personal norms in terms of gender

Regarding hometown, participants, who live in town ($M=4.37$, $SD=.51$) had higher tendency to exhibit moderately more personal norm than those living in city center ($M=4.19$, $SD=.67$), district ($M=4.18$, $SD=.65$) and village ($M=4.15$, $SD=.54$). Figure 30 indicated a clear picture with mean scores of personal norm with respect to hometown of the middle school students.

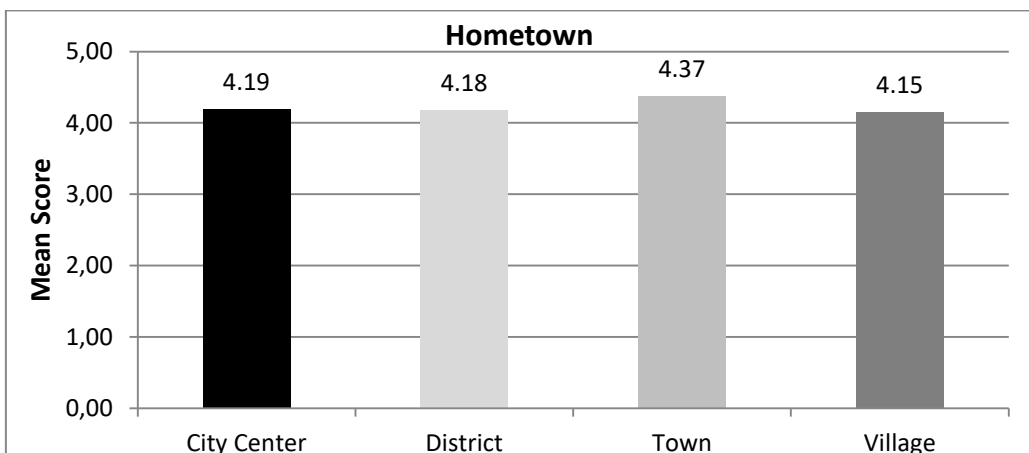


Figure 30. Mean scores of middle school students' personal norms in terms of hometown

Table 53. Frequency distributions of middle school students' responses to factors of personal norm statements and corresponding item means and standard deviations

Items	Percentage					Item	Item
	SD	D	U	A	SA	M	SD
I feel morally obliged to protect nature, regardless of what others do.	3.4	4.2	20.0	26.7	43.1	4.05	1.05
I'm willing to take action to stop environmental pollution.	2.1	2.5	18.4	30.6	43.7	4.15	.94
It is wrong for me to harm the environment.	2.1	2.5	8.6	18.0	66.1	4.48	.90
I feel guilty if I harm natural life.	2.7	4.6	11.8	26.7	51.5	4.23	1.00
Protecting nature is my personal responsibility.	3.7	4.3	14.5	26.2	48.0	4.14	1.05
Everyone should take responsibility to protect nature.	2.1	2.7	10.3	20.3	61.6	4.41	.93
I refrain from harming the nature because I feel obliged to nature and to other creatures.	2.4	3.1	11.3	27.2	53.1	4.29	.95
I feel a personal obligation to do whatever I can to prevent climate change.	5.1	6.3	23.8	25.3	36.0	3.84	1.13
As long as I don't have to change my lifestyle, I do my best to protect the environment.	3.2	4.1	15.8	26.6	47.1	4.14	1.03
Total Scale						4.19	.65

Note: SD: Strongly disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly agree, M: Mean, SD: Standard deviation

Regarding personal norms of middle school students, there were 9 five-point likert type items (see Table 53). The mean score on personal norm was calculated as 4.19 with a standard deviation .65. Considering items, three quarters of middle school students believe that they feel high personal norm (75.31%). Many of them feel them morally obliged to protect nature, regardless of what others do (69.8%), believe that it is wrong for them to harm the environment (84.1%), protecting nature is their personal responsibilities (74.2%), everyone should take responsibility to protect nature (81.9%), they refrain from harming the nature because they feel obliged to nature and to other creatures (80.3%) and feel guilty if they harm natural life (78.2%). In addition, more than half of middle school students feel a personal obligation to do whatever they can to prevent climate

change (61%) and state that as long as they don't have to change their lifestyle, they do their best to protect the environment (73.7%).

4.2.4.2. Personal Norms of Pre-Service Science Teachers

In this section, items and total mean scores, standard deviations and frequency distributions of personal norms of pre-service science teachers with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of personal norms of pre-service science teachers with respect to gender and grade level are involved in Table 54.

Table 54. Mean scores and standard deviations for personal norms of pre-service science teachers with respect to gender and grade level.

Grade	Gender	M	SD
1th Grade	Female	4.50	.42
	Male	4.07	.53
2th Grade	Female	4.39	.54
	Male	4.33	.52
3th Grade	Female	4.50	.48
	Male	4.53	.40
4th Grade	Female	4.49	.48
	Male	4.26	.51
TOTAL		4,45	.49

Personal norm means were engaged mostly by female pre-service science teachers at first ($M=4.50$, $SD=.42$), second ($M=4.39$, $SD=.54$) and fourth grade ($M=4.49$, $SD=.48$). However, the means value of males are also high at first ($M=4.07$, $SD=.53$), second ($M=4.33$, $SD=.52$), third ($M=4.53$, $SD=.40$) and fourth grade ($M=4.26$, $SD=.51$). When responses were examined with respect to gender

(Figure 31), it was found that female pre-service science teachers' scores on personal norm is 4.46 with standard deviation .49, while the mean value of males on personal norm is 4.35 with standard deviation .49.

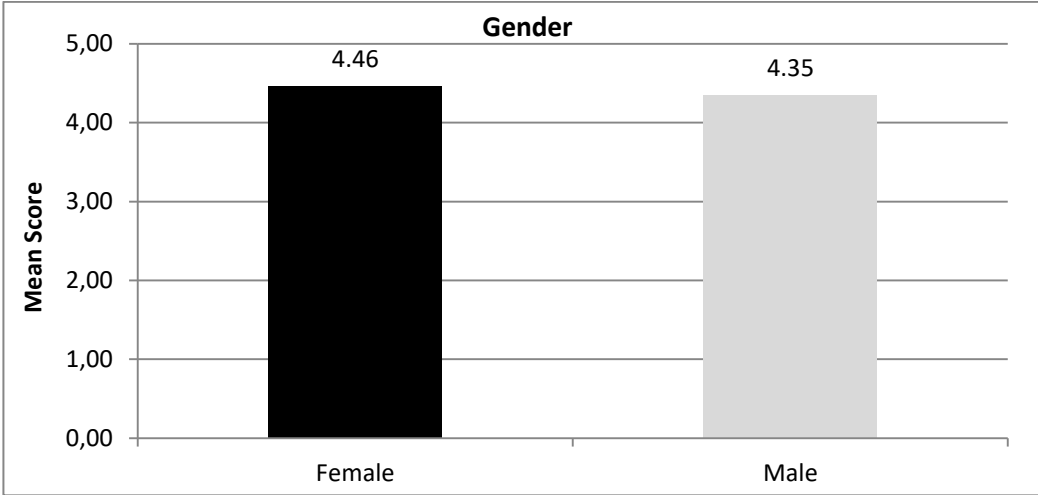


Figure 31. Mean scores of pre-service science teachers' personal norms in terms of gender

Regarding hometown, participants, who live in district ($M=4.47$, $SD=.46$) had higher tendency to exhibit moderately more personal norm than those living in city center ($M=4.46$, $SD=.51$), town ($M=4.38$, $SD=.46$) and village ($M=4.42$, $SD=.46$). Figure 32 indicated a clear picture with mean scores of personal norm with respect to hometown of the pre-service science teachers.

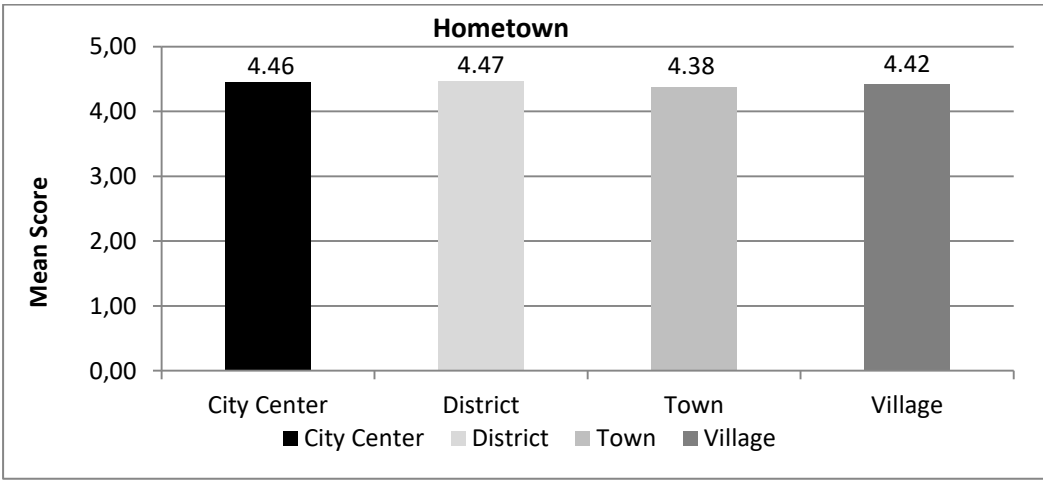


Figure 32. Mean scores of pre-service science teachers' personal norms in terms of hometown

Table 55 illustrates pre-service science teachers' responses to personal norm statements and corresponding item means and standard deviations.

Table 55. Frequency distributions of pre-service science teachers' responses to factors of personal norm statements and corresponding item means and standard deviations

Items	Percentage					Item	Item
	SD	D	U	A	SA	M	SD
I feel morally obliged to protect nature, regardless of what others do.	1.9	-	5.2	41.0	50.7	4.42	0.68
I'm willing to take action to stop environmental pollution.	.4	1.7	11.0	46.3	39.9	4.24	0.74
It is wrong for me to harm the environment.	.6	.7	2.8	24.9	70.2	4.65	0.62
I feel guilty if I harm natural life.	.3	1.4	4.6	31.1	61.7	4.54	0.67
Protecting nature is my personal responsibility.	.7	1.0	3.6	34.9	59.1	4.52	0.68
Everyone should take responsibility to protect nature.	.1	.7	2.2	27.6	68.2	4.65	0.57
I refrain from harming the nature because I feel obliged to nature and to other creatures.	.4	.8	4.0	32.2	61.6	4.55	0.65
I feel a personal obligation to do whatever I can to prevent climate change.	.8	1.9	11.7	39.1	45.2	4.27	0.80
As long as I don't have to change my lifestyle, I do my best to protect the environment.	1.2	5.5	12.0	34.9	45.3	4.19	0.93
Total Scale						4.45	.49

Note: SD: Strongly disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly agree, M: Mean, SD: Standard deviation

Regarding personal norms of pre-service science teachers, there were 9 five-point likert type items (see Table 55). The mean score on personal norm was calculated as 4.45 with a standard deviation .49. Considering items, three quarters of pre-service science teachers believe that they feel high personal norm (90.43%). Many of them feel them morally obliged to protect nature, regardless of what others do (91.7%), believe that it is wrong for them to harm the environment (95.1%), protecting nature is their personal responsibilities (94%), everyone should take responsibility to protect nature (95.8%), they refrain from harming the nature because they feel obliged to nature and to other creatures (93.8%) and

feel guilty if they harm natural life (92.8%). In addition, more than three quarters of pre-service science teachers feel a personal obligation to do whatever they can to prevent climate change (84.3%) and state that as long as they don't have to change their lifestyle, they do their best to protect the environment (80.2%).

4.2.4.3. Personal Norms of Science Teachers

Data collected related to personal norms of science teachers were presented in this section. Mean scores and standard deviations of personal norms of science teachers with respect to gender are involved in Table 56.

Table 56. Mean scores and standard deviations of personal norms of science teachers with respect to gender

Gender	M	SD
Female	4.55	.45
Male	4.46	.45
Total	4.52	.45

As presented in the Table 56, personal norms were engaged mostly by female science teachers ($M=4.55$, $SD=.45$) than male science teachers ($M=4.46$, $SD=.45$). Table 57 illustrates science teachers' responses to personal norm statements and corresponding item means and standard deviations. Regarding personal norms of science teachers, there were 9 five-point likert type items. The mean score on personal norm was calculated as 4.52 with a standard deviation .68. Considering items, three quarters of science teachers believe that they feel high personal norm (93.51%). Many of them feel them morally obliged to protect nature, regardless of what others do (94.4%), believe that it is wrong for them to harm the environment (97.3%), protecting nature is their personal responsibilities (94.2%), everyone should take responsibility to protect nature (97.2%), they refrain from

harming the nature because they feel obliged to nature and to other creatures (97.2%) and feel guilty if they harm natural life (96%).

Table 57. Frequency distributions of science teachers' responses to factors of personal norm statements and corresponding item means and standard deviations

Items	Percentage					Item	Item
	SD	D	U	A	SA	M	SD
I feel morally obliged to protect nature, regardless of what others do.	.8	.5	4.3	33.8	60.6	4.53	0.68
I'm willing to take action to stop environmental pollution.	1.0	.5	7.3	47.1	44.1	4.33	0.72
It is wrong for me to harm the environment.	.2	.2	2.3	23.8	73.5	4.70	0.53
I feel guilty if I harm natural life.	-	-	4.0	28.6	67.4	4.63	0.56
Protecting nature is my personal responsibility.	.3	.8	4.0	33.8	60.4	4.51	0.74
Everyone should take responsibility to protect nature.	-	-	1.7	27.3	69.9	4.65	0.65
I refrain from harming the nature because I feel obliged to nature and to other creatures.	-	.2	2.3	29.3	67.9	4.65	0.53
I feel a personal obligation to do whatever I can to prevent climate change.	.3	1.2	6.3	36.3	55.9	4.46	0.70
As long as I don't have to change my lifestyle, I do my best to protect the environment.	1.8	7.0	9.0	35.3	46.6	4.18	0.98
Total Scale						4.52	0.68

Note. SD: Strongly disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly agree, M: Mean, SD: Standard deviation

In addition, more than three quarters of science teachers feel a personal obligation to do whatever they can to prevent climate change (92.2%) and state that as long as they don't have to change their lifestyle, they do their best to protect the environment (81.9%).

4.2.5. Self-Identity

In the first research question, one of the aims is to investigate middle school students' pre-service science teachers' and science teachers' self-identities. Therefore, in this section analysis toward this aim are involved. The descriptive

statistics involving mean scores and standard deviations of with respect to the three sample group were indicated in Table 58.

Table 58. Mean scores and standard deviations of self-identity with sample group

Sample	M	SD
Middle School Students	3.94	.75
Pre-Service Science Teacher	4.08	.64
Science Teacher	4.32	.56
TOTAL	4.00	.73

As presented in the Table 58, middle school students' responses produced a mean score of 3.94 ($SD=.75$), the mean value of pre-service science teachers' self-identity is 4.08 ($SD=.64$) and the mean value of science teachers' self-identity is 4.32 ($SD=.56$). These results showed that science teachers have higher self-identity value than pre-service science teachers and middle school students.

4.2.5.1. Self-identity of Middle School Students

In this section, items and total mean scores, standard deviations and frequency distributions of self-identity of middle school students with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of self-identity of middle school students with respect to gender and grade level are involved in Table 59. Self-identity means were engaged mostly by female middle school students at fifth ($M=4.09$, $SD=.74$), seventh ($M=3.94$, $SD=.68$) and eight grade ($M=3.93$, $SD=.71$). However, the means value of males are also high at fifth ($M=3.99$, $SD=.74$), sixth ($M=3.97$, $SD=.78$), seventh ($M=3.91$, $SD=.81$) and eight grade ($M=3.89$, $SD=.77$). When responses were examined with respect to gender (Figure 33), it was found that female middle school students' scores on self-identity is 3.96, while the mean value of males on self-identity is 3.92.

Table 59. Mean scores and standard deviations for self-identity of middle school students with respect to gender and grade level.

Grade	Gender	M	SD
5th Grade	Female	4.09	.74
	Male	3.99	.74
6th Grade	Female	3.94	.75
	Male	3.97	.78
7th Grade	Female	3.94	.68
	Male	3.91	.81
8th Grade	Female	3.93	.71
	Male	3.89	.77
TOTAL		3.96	.75

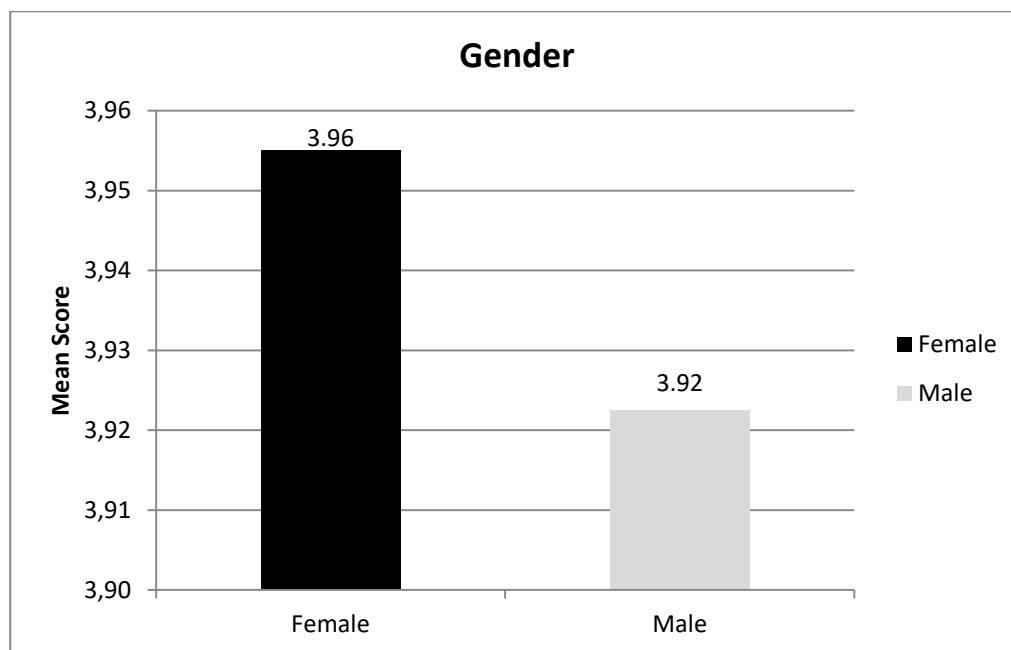


Figure 33. Mean scores of middle school students' self-identity in terms of gender

Regarding hometown, participants, who live in town ($M=4.12$, $SD=.56$) had higher tendency to exhibit moderately more self-identity scores than those living in city center ($M=3.94$, $SD=.76$) and district ($M=3.94$, $SD=.74$) and village

($M=3.86$, $SD=.65$). Figure 34 indicated a clear picture with mean scores of self-identity with respect to hometown of the middle school students.

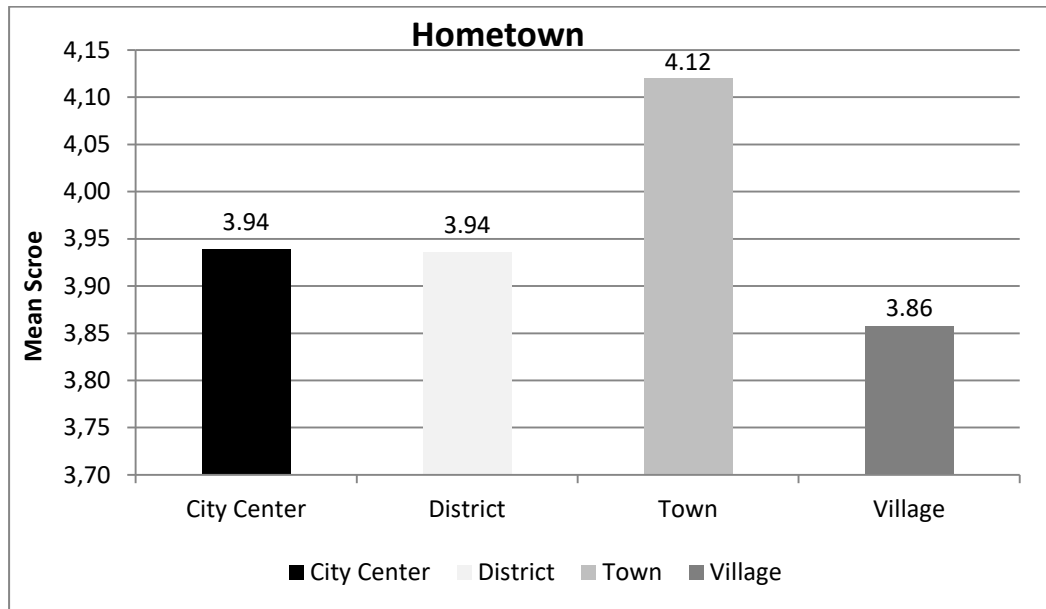


Figure 34. Mean scores of middle school students' self-identity in terms of hometown

Table 60 illustrates middle school students' responses to self-identity statements and corresponding item means and standard deviations.

Table 60. Frequency distributions of middle school students' responses to factors of self-identity statements and corresponding item means and standard deviations

Items	Percentage					Item M	Item SD
	SD	D	U	A	SA		
I think of myself as a nature friendly	3.9	3.7	14.4	31.7	44.0	4.11	1.04
Exhibiting environmentalist behavior is an important part of who I am	2.4	3.6	18.4	31.6	41.5	4.09	0.97
I am the type of person who behave eco-friendly	2.4	4.4	21.3	32.5	36.6	3.99	0.99
I think of myself as someone who is very concerned with environmental problems	6.7	9.5	26.4	26.9	27.7	3.61	1.17
I see myself as a eco-friendly consumer	5.1	5.1	22.0	28.6	36.5	3.89	1.11
Total Scale						3.94	1.06

Regarding self-identity of middle school students, there were 5 five-point likert type items (see Table 60). The mean score on self-identity was calculated as 3.94 with a standard deviation 1.06. Considering items, many of middle school students think of them as a nature friendly (75.7%), believe that exhibiting environmentalist behavior is an important part of who they are (73.1%) and they are the type of person who behave eco-friendly (69.1%). However, more than half of middle school students think of them as someone who are very concerned with environmental problems (54.6%) and see them as an eco-friendly consumer (65.1%).

4.2.5.2. Self-Identity of Pre-Service Science Teachers

In this section, items and total mean scores, standard deviations and frequency distributions of self-identity of pre-service science teachers with respect to demographic characteristics including grade level, gender and hometown. Mean scores and standard deviations of self-identity of pre-service science teachers with respect to gender and grade level are involved in Table 61.

Table 61. Mean scores and standard deviations for self-identity of pre-service science teachers with respect to gender and grade level.

Grade	Gender	M	SD
1th Grade	Female	3.97	.66
	Male	3.70	.61
2th Grade	Female	4.03	.65
	Male	4.10	.61
3th Grade	Female	4.10	.67
	Male	4.14	.60
4th Grade	Female	4.18	.58
	Male	4.00	.59
TOTAL		4.03	.62

The mean score of self-identity were engaged for first ($M=3.97$, $SD=.66$) and fourth grade ($M=4.18$, $SD=.58$) mostly by female pre-service science teachers, while the the mean scores toward self-identity of male pre-service science teachers are higher at second ($M=4.10$, $SD=.61$) and third grade ($M=4.14$, $SD=.60$) than females. When responses were examined with respect to gender (Figure 35), it was found that female pre-service science teachers' scores on self-identity is 4.08 with standard deviation .64, while the mean value of males on self-identity is 4.06 with standard deviation .61. This result showed that females have better self-identity related to environmental issues.

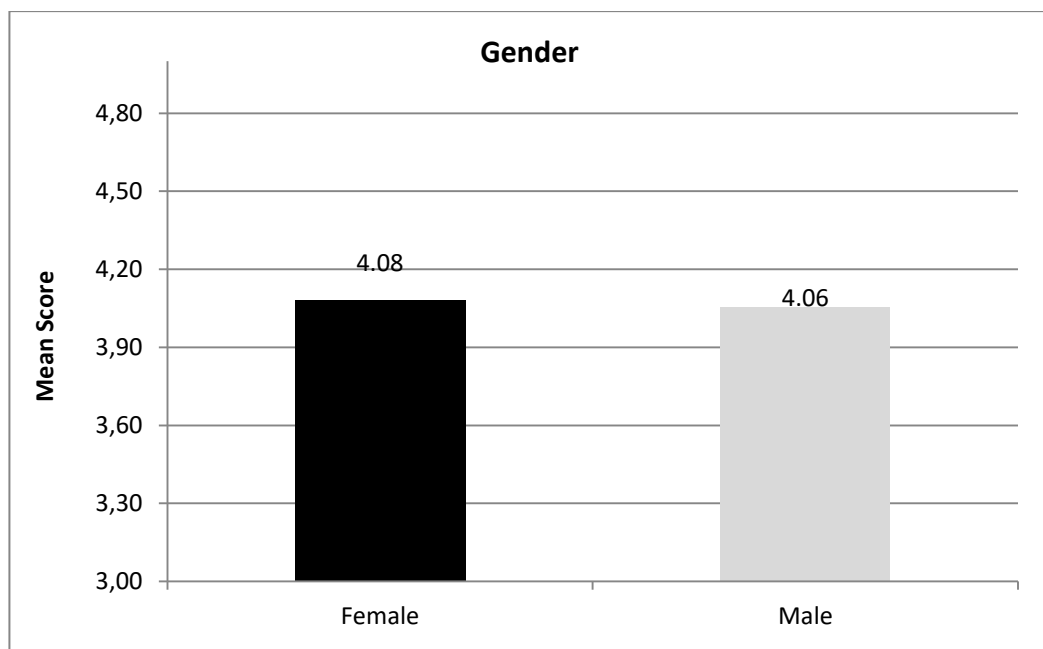


Figure 35. Mean scores of pre-service science teachers' self-identity in terms of gender

Regarding hometown, participants who live in city center ($M=4.11$, $SD=.65$) and district ($M=4.10$, $SD=.57$) had higher tendency to exhibit moderately more self-identity scores than those living in village ($M=4.00$, $SD=.73$) and town ($M=3.81$, $SD=.49$). This result imply that hometown have an important place for self-identity related to environmental aspect. Figure 36 indicated a clear picture with mean scores of self-identity with respect to hometown of the pre-service science teachers.

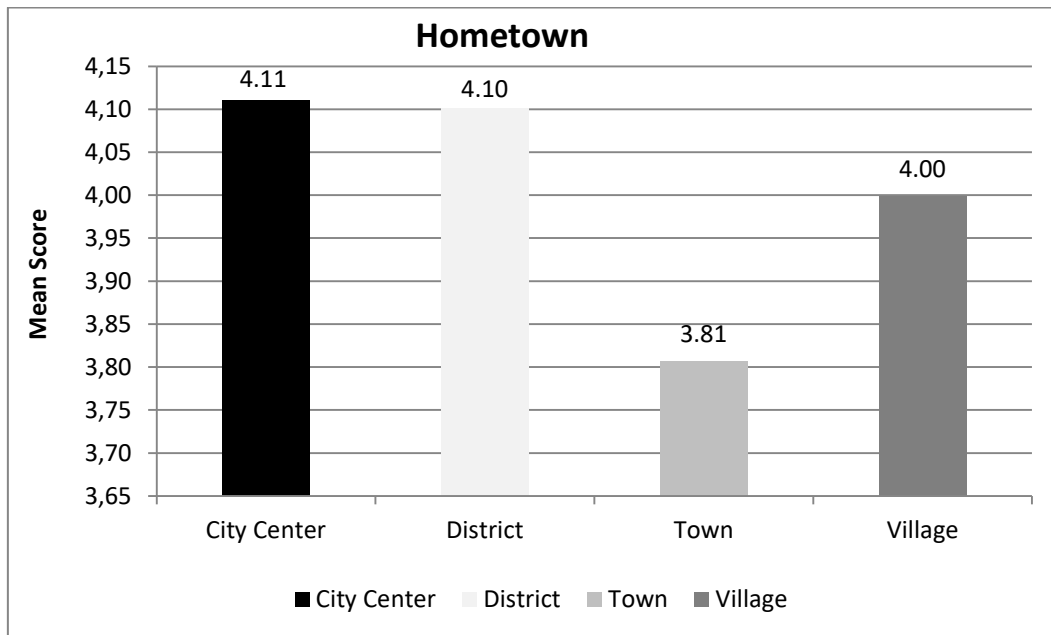


Figure 36. Mean scores of pre-service science teachers' self-identity in terms of hometown

Table 62 illustrates pre-service science teachers' responses to self-identity statements and corresponding item means and standard deviations.

Table 62. Frequency distributions of pre-service science teachers' responses to factors of self-identity statements and corresponding item means and standard deviations.

Items	Percentage					Item M	Item SD
	SD	D	U	A	SA		
I think of myself as a nature friendly	1.2	2.8	13.0	49.3	32.5	4.10	0.82
Exhibiting environmentalist behavior is an important part of who I am	1.4	-	9.7	48.1	39.6	4.28	0.69
I am the type of person who behave eco-friendly	.3	1.7	14.6	47.8	34.7	4.16	0.75
I think of myself as someone who is very concerned with environmental problems	1.1	5.4	25.0	39.8	27.8	3.89	0.91
I see myself as a eco-friendly consumer	.6	4.8	22.0	41.2	30.2	3.97	0.87
Total Scale						4.08	0.81

Note: SD: Strongly disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly agree, M: Mean, SD: Standard deviation

Regarding self-identity of pre-service science teachers, there were 5 five-point likert type items (see Table 62). The mean score on self-identity was calculated as 4.08 with a standard deviation .81. Considering items, more than three quarters of pre-service science teachers think of them as a nature friendly (81.8%), believe that exhibiting environmentalist behavior is an important part of who they are (87.7%) and they are the type of person who behave eco-friendly (82.5%). In addition, a vast majority of pre-service science teachers think of them as someone who are very concerned with environmental problems (67.6%) and see them as an eco-friendly consumer (71.4%).

4.2.5.3. Self-Identity of Science Teachers

Data collected related to self-identity of science teachers were presented in this section. Mean scores and standard deviations of self-identity of science teachers with respect to gender are involved in Table 63.

Table 63. Mean scores and standard deviations of self-identity of science teachers with respect to gender

Gender	M	SD
Female	4.33	.56
Male	4.30	.56
Total	4.32	.56

As presented in the Table 63, self-identity were engaged a few more mean scores by female science teachers ($M=4.33$, $SD=.56$) than male science teachers ($M=4.30$, $SD=.56$). Table 64 illustrates science teachers' responses to self-identity statements and corresponding item means and standard deviations. Regarding self-identity of science teachers, there were 5 five-point likert type items (see Table 64). The mean score on self-identity was calculated as 4.32 with a standard deviation .69. Considering items, more than ninety percent of science teachers

think of them as a nature friendly (93.5%), believe that exhibiting environmentalist behavior is an important part of who they are (93.6%) and they are the type of person who behave eco-friendly (94.1%). In addition, a vast majority of science teachers think of them as someone who are very concerned with environmental problems (91.3%) and see them as an eco-friendly consumer (89.3%).

Table 64. Frequency distributions of science teachers' responses to factors of self-identity statements and corresponding item means and standard deviations

Items	Percentage					Item	Item
	SD	D	U	A	SA	M	SD
I think of myself as a nature friendly	.7	1.8	3.7	49.4	44.1	4.35	.70
Exhibiting environmentalist behavior is an important part of who I am	-	1.8	4.2	50.2	43.4	4.36	.65
I am the type of person who behave eco-friendly	.2	1.2	4.0	50.2	43.9	4.37	.66
I think of myself as someone who is very concerned with environmental problems	.5	2.0	5.8	51.7	39.6	4.28	.73
I see myself as a eco-friendly consumer	.5	1.3	8.3	50.9	38.4	4.25	.73
Total Scale						4.32	.69

Note: SD: Strongly disagree, D: Disagree, U: Undecided, A: Agree, SA: Strongly agree, M: Mean, SD: Standard deviation

4.3. Path Analysis

In this part, results of path analysis was presented. In this regard, assumptions of path analysis was examined. Then the answer of the research question presented below was sought through presenting models fit indices and path coefficients.

1. In what ways are there relationship between middle school students' pre-service science teachers' and science teachers' ecological worldview, fundamental values, personal norm and self-identity?

Path analysis was employed by making use of AMOS 21 to test the relationship among middle school students', pre-service science teachers' and science

teachers' ecological worldviews, fundamental values, personal norms and self-identities. In the model, there are seven constant variable including self-identity, egoistic value, altruistic value, biospheric value, nature based ecological world views, human based ecological worldviews and personal norm. The analysis were presented in three steps for three sample groups separately: (1) the description of the proposed model, (2) the model fit summary for the model, (3) and direct, indirect, and total effects of the model. Each line presented in Figure 37 represents a direct effect of one variable on another.

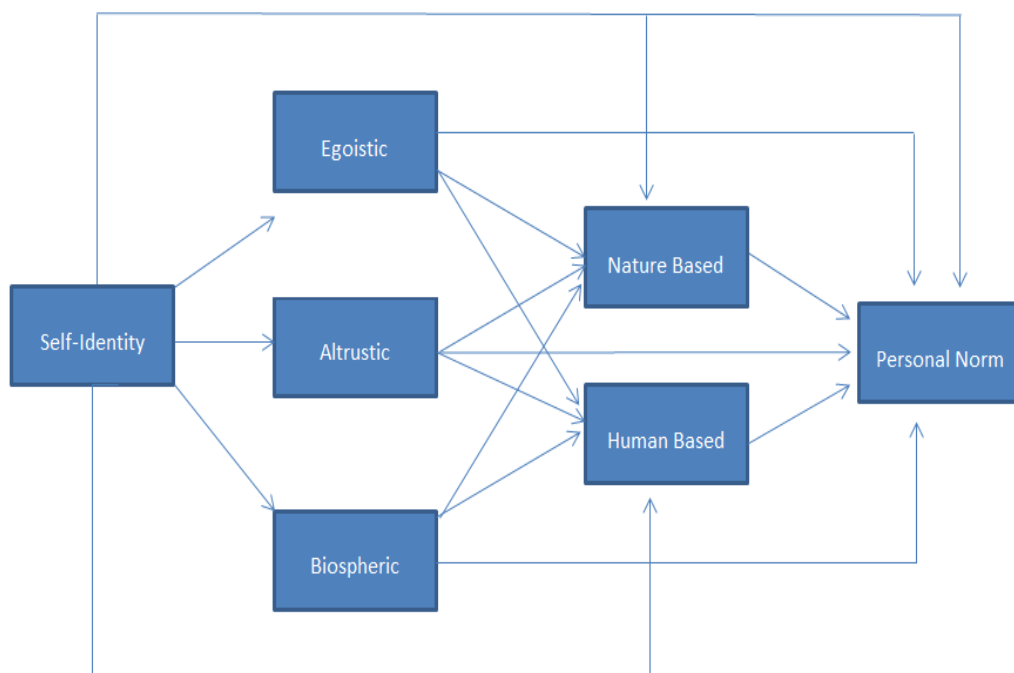


Figure 37. Proposed models explaining the relationships among ecological worldview, fundamental values, personal norm and self-identity

4.3.1. Model Fit Indices

Firstly, the theoretical model was tested with middle school students, pre-service science teachers and science teachers. Then, non-significant paths in the model were deleted. In order to reveal whether the model fit the data or not, model fit indices of model were examined. Based on literature, some criteria indicated in Table 65 were determined. Results of model fit showed that chi-square test were obtained from middle school students as significant ($\chi^2(655)= 2056.70, p < .05$)

and the value of χ^2/df was founded as 3.14. Comparative fit indices (CFI) value founded as .92. The root mean square error of approximation (RMSEA) was found as .03 and standardized root mean square residual (SRMR) value was produced as .03. Chi-square test were obtained from pre-service science teachers significant ($\chi^2(667)= 1474.74, p < .05$) and the value of χ^2/df was founded as 2.21.

Table 65. Selected Model Fit and Acceptable Criteria

Fit Index	Calculated Value			Acceptable Values
	MSS	PST	ST	
χ^2	2056.70	1474.74	1640.32	small
df	655	667	669	-
χ^2 /df	3.14	2.21	2.45	$2 < < 5$
χ^2 significance (p)	$p > .05$	$p > .05$	$p > .05$	$p < .05$
CFI	.92	.91	.91	$> .90$
RMSEA	.03	.04	.05	$< .08$
SRMR	.03	.05	.06	$< .08$

Note. CFI=Comparative Fit Index, RMSEA=Root Mean Square Error of Approximation, SRMR=Standardized Root Mean Square Residual, MSS= Middle School Students, PST= Pre-Service Science Teachers, ST= Science Teachers

Comparative fit indices (CFI) value founded as .91 The root mean square error of approximation (RMSEA) was found as .04 and standardized root mean square residual (SRMR) value was produced as .05. Chi-square test were obtained from science teachers significant ($\chi^2(669)= 1640.32, p < .05$) and the value of χ^2/df was founded as 2.45. Comparative fit indices (CFI) value founded as .91 The root mean square error of approximation (RMSEA) was found as .05 and standardized root mean square residual (SRMR) value was produced as .06.

Considering on suggested values of model fit, chi-square(x^2)/degrees of freedom (df) should be between 2 and 5 (Byrne, 1989; Carmines & McIver, 1981). If the value of comparative fit index (CFI) is close to 1, it can be considered as good fit (Bentler, 1990), and if the value is above .90, it can be considered as permissible (Hair et al., 2010). If the value of Root Mean Square Error of Approximation (RMSEA) is less than .05 (Browne & Cudeck, 1993), it can be considered as good fit, between .08 and .10, it can be considered as medium level and greater than .10, it can be concluded that this is poor fit (MacCallum, Widaman, Zhang, & Hong, 1999). Lastly, the value of Standardized Root Mean Square Residual (SRMR) should be less than .08 to provide good fit model (Byrne, 2010). Considering values obtained in the present study, it can be stated that since all the values are provide the suggested values, goodness of fit indices for the model is acceptable for entire sample groups.

4.3.1.1. Results of Direct, Indirect, and Total Effects of Revised Models

Based on the results of explanatory factor analysis and literature, middle school students', pre-service science teachers' and science teachers' path model explaining the relationships among ecological worldview, fundamental values, personal norm and self-identity was developed. Direct, indirect, and total effects were given for entire sample groups separately. Interpretation of path coefficients was provided with the criteria of Cohen (1988). According to the criteria, if standardized path coefficient (β) is less than .10, it means small effect; is close to .30, it means medium effect and is greater than .50, it means large effect.

4.3.1.2. Path Model Explaining the Relationships among Middle School Students' Ecological Worldview, Fundamental Values, Personal Norm and Self-Identity

A path analysis was conducted to determine the causal relations among variables middle school students' ecological worldview, fundamental values, personal norm and self-identity. Since some path coefficients were not statistically

significant in the model, these paths were removed from the model. For example, paths between egoistic value and personal norm, Biospheric value and personal norm, Biospheric value and human based view, Biospheric value and nature based view and self-identity and nature based view were removed from path analysis. 80% of the variance of personal norm was explained by the variables in the model. The standardized path coefficients of direct effects were presented in Figure 38. Considering direct effects, the standardized path coefficients ranged from -0.48 to 0.61. Indirect and total effects were also mentioned in Table 66.

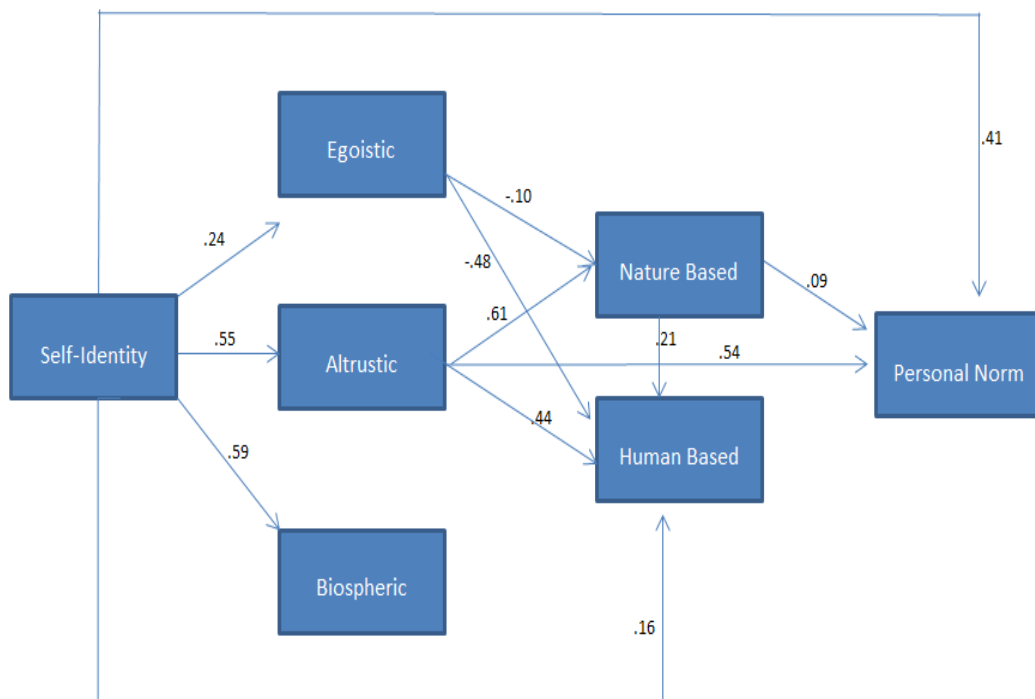


Figure 38. Path model explaining the relationships among middle school students' ecological worldview, fundamental values, personal norm and self-identity

Taking into consideration Figure 38, regarding variables associated with self-identity, it was observed that self-identity had a small and positive effect on egoistic value ($\beta=.24$), medium and positive effect on personal norm ($\beta=.41$) and large and positive effect on altruistic value ($\beta=.55$) and biospheric value ($\beta=.59$). It means that middle school students who have more self-identity awareness toward environment tended to have more biospheric value than altruistic and

egoistic value and have more personal norm related to environmental issues. Moreover, self-identity had positive and small effect on human based view ($\beta=.16$) and medium effect on personal norm ($\beta=.41$) indicating middle school students who have high self-identity awareness about environmental issues tended to have more personal norm related to the environmental issues. Considering fundamental values, altruistic value had a positive and large effect on nature based view ($\beta=.61$) and personal norm ($\beta=.54$) and medium effect on human based view ($\beta=.44$), while egoistic value had negative and small effect on nature based view ($\beta=-.10$) and medium effect on human based view ($\beta=-.48$). These results showed that middle school students who have high egoistic value tended to have low nature based and human based views. Having higher altruistic value brings about higher personal norm related to the environmental issues. Nature based views of middle school students are negatively related to human based view ($\beta=-.21$).

In addition to direct effects, path analysis provides information about indirect effects. There are several indirect effects that are presented in Table 66. The highest indirect path coefficient was founded between self-identity and nature based view ($\beta =.36$) which was attributed to the direct effect of egoistic value and altruistic value on nature based view. Self-Identity had also indirect effect on human based view ($\beta =.05$) through its direct effects on egoistic value and altruistic value and indirect effect on personal norm ($\beta =.33$) through its direct effects on egoistic value, altruistic values and nature based views. Indirect path coefficient of egoistic value on human based view was $\beta = -.02$ and personal norm was $\beta = -.01$ which could be mainly originated from the direct effect of these variables on nature based views. Lastly, altruistic values had indirect effect on human based view ($\beta =-.13$) and personal norm ($\beta =.06$) which might be caused from direct effect of this variable on nature based views.

Considering total effects, the strongest positive total effect on personal norm stem from self-identity ($\beta =.74$), while the strongest negative total effect was

originated from the egoistic value on human based view ($\beta = -.50$). Self-identity ($\beta = .21$) and altruistic value ($\beta = .31$) had also moderated positive total effect on human based view. Egoistic value had small effect on personal norm ($\beta = .01$), while altruistic value had large effect on personal norm ($\beta = .60$).

4.3.1.3. Path Model Explaining the Relationships among Pre-Service Science Teachers' Ecological Worldview, Fundamental Values, Personal Norm and Self-Identity

A path analysis was conducted to determine the causal relations among variables pre-service science teachers' ecological worldview, fundamental values, personal norm and self-identity. Since some path coefficients were not statistically significant in the model, these paths were removed from the model. For example, paths between egoistic value and personal norm, Biospheric value and personal norm, altruistic value and nature based view, Biospheric value and human based view, human based views and personal norm and altruistic value and human based view were removed from path analysis. 68% of the variance of personal norm was explained by the variables in the model. The standardized path coefficients of direct effects were presented in Figure 39. Considering the direct effects, the standardized path coefficients ranged from -0.20 to 0.72. Indirect and total effects were also given in Table 67. Taking into consideration Figure 39, regarding variables associated with self-identity, it was observed that self-identity had a small and positive effect on egoistic value ($\beta = .22$), moderate and positive effect on altruistic value ($\beta = .43$) and large and positive effect on biospheric value ($\beta = .56$). It means that pre-service science teachers who have more self-identity awareness toward environment tended to have more biospheric value than altruistic and egoistic value. Moreover, self-identity had positive and small effect on nature based view ($\beta = .09$) and human based view ($\beta = .13$) and medium effect on personal norm ($\beta = .45$) indicating pre-service science teachers who has high self-identity awareness about environmental issues tended to have more personal norm related to the environmental issues.

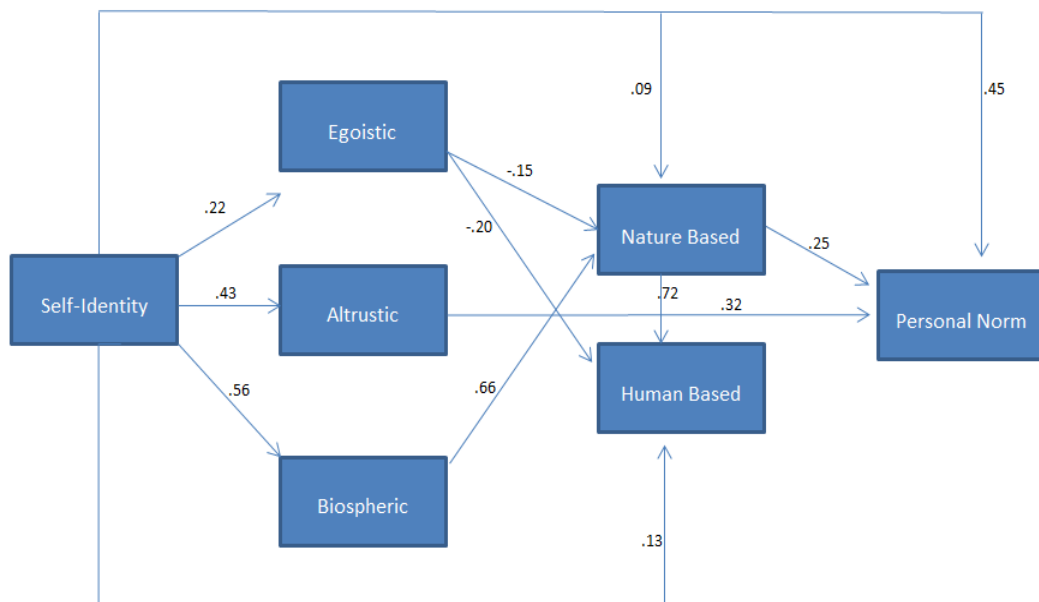


Figure 39. Path model related to explaining the relationships among pre-service science teachers' ecological worldview, fundamental values, personal norm and self-identity

Considering fundamental values, biospheric value had a positive and large effect on nature based view ($\beta=.66$), altruistic value had a positive and medium effect on personal norm ($\beta=.32$), while egoistic value had negative and small effect on nature based view ($\beta=-.15$) and human based view ($\beta=-.20$). These results showed that pre-service science teachers who have high biospheric value tended to have high nature based views, while pre-service science teachers who have high egoistic value tended to have low nature based and human based views. Having higher altruistic value brings about higher personal norm related to the environmental issues. Nature based views of pre-service science teachers are related to human based view ($\beta=.72$) positively with high level and are related to personal norm ($\beta=.25$) positively with small level. In other words, pre-service science teachers protecting environment due to enhancing the quality of human life had a perception about higher personal norm related to the environmental issues. In addition to direct effects, path analysis provides information about indirect effects. There are several indirect effects that are presented in Table 67.

Table 66. Direct, indirect and total path coefficients for model of middle school students

Variables	Egoistic Value			Altrusic Value			Biospheric Value			Nature Based View			Human Based View			Personal Norm		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direc	Indirect	Total	Direct	Indirect	Total
Self-Identity	.24	-	.24	.55	-	.55	.59	-	.59	-	.36	.36	.16	.05	.21	.41	.33	.74
Egoistic Value	-	-	-	-	-	-	-	-	-	-.10	-	-.10	-.48	-.02	-.50	-	.01	.01
Altrusic Value	-	-	-	-	-	-	-	-	-	.61	-	.61	.44	-.13	.31	.54	.06	.60
Biospheric Value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nature Based View	-	-	-	-	-	-	-	-	-	-	-	-	-.21	-	-.21	-	-	-
Human Based View	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

The highest indirect path coefficient was founded between biospheric value and human based view ($\beta = .47$) which was attributed to the direct effect of biospheric value on nature based view. Self-Identity had indirect effect on nature based view ($\beta = .33$), human based view ($\beta = .26$) through its direct effects on egoistic and biospheric values and indirect effect on personal norm ($\beta = .24$) through its direct effects on egoistic value, biospheric values and nature based views. Indirect path coefficient of egoistic value on human based view was $\beta = -.11$ and personal norm was $\beta = -.04$ which could be mainly originated from the direct effect of these variables on nature based views. Lastly, biospheric values had indirect effect ($\beta = .16$) on personal norm which might be caused from direct effect of this variable on nature based views.

Considering total effects, the strongest positive total effect on human based view stem from nature based view ($\beta = .72$), while the strongest negative total effect was originated from the egoistic value ($\beta = -.31$). Self identity ($\beta = .42$) had the moderated positive total effect on nature based view, had positive and high total effect on personal norm ($\beta = .69$) and small effect on human based view ($\beta = .12$).

4.3.1.4. Path Model Explaining the Relationships among Science Teachers' Ecological Worldview, Fundamental Values, Personal Norm and Self-Identity

A path analysis was conducted to determine the causal relations among variables science teachers' ecological worldview, fundamental values, personal norm and self-identity. Since some path coefficients were not statistically significant in the model, these paths were removed from the model. For example, paths between egoistic value and personal norm, self-identity and human based views, Biospheric value and human based view, human based views and personal norm, altruistic value and nature based view, altruistic value and personal norm and altruistic value and human based view were removed from path analysis. 59% of the variance of personal norm was explained by the variables in the model. The

standardized path coefficients of direct effects were presented in Figure 40. Considering the direct effects, the standardized path coefficients ranged from -0.15 to 0.60. Indirect and total effects were also given in Table 68.

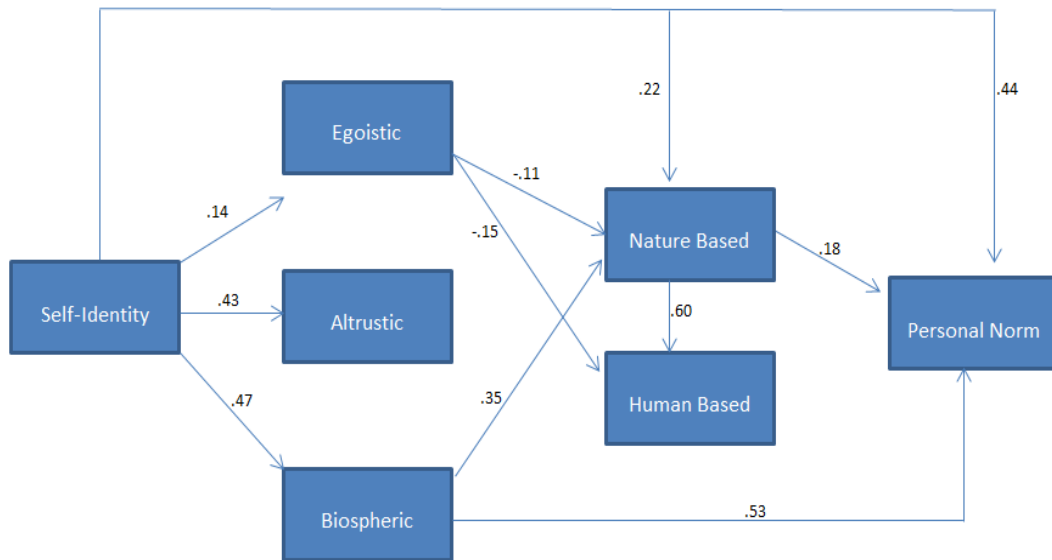


Figure 40. Path model related to explaining the relationships among science teachers' ecological worldview, fundamental values, personal norm and self-identity

Taking into consideration Figure 40, regarding variables associated with self-identity, it was observed that self-identity had a small and positive effect on egoistic value ($\beta=.14$), moderate and positive effect on altruistic value ($\beta=.43$) and large and positive effect on biospheric value ($\beta=.47$). It means that science teachers who have more self-identity awareness toward environment tended to have more biospheric value than altruistic and egoistic value.

Moreover, self-identity had positive and small effect on nature based view ($\beta=.22$) and medium effect on personal norm ($\beta=.44$) indicating science teachers who has high self-identity awareness about environmental issues tended to have more personal norm related to the environmental issues. Considering fundamental values, biospheric value had a positive and medium effect on nature based view ($\beta=.35$), biospheric value had a positive and large effect on personal norm ($\beta=.53$), while egoistic value had negative and small effect on nature based view

($\beta = -.11$) and human based view ($\beta = -.15$). These results showed that science teachers who has high biospheric value tended to have high nature based views, while science teachers who has high egoistic value tended to have low nature based and human based views.

Nature based views of science teachers are related to human based view ($\beta = .60$) positively with high level and are related to personal norm ($\beta = .18$) positively with small level. In other words, science teachers protecting environment due to enhancing the quality of human life had a perception about higher personal norm related to the environmental issues.

In addition to direct effects, path analysis provides information about indirect effects. There are several indirect effects that are presented in Table 68. The highest indirect path coefficient was founded between self-identity and personal norm ($\beta = .22$) which was attributed to the direct effect of biospheric value and egoistic value on nature based view. Self-identity had also indirect effect on nature based view ($\beta = .15$), human based view ($\beta = .17$) through its direct effects on egoistic and biospheric values. Indirect path coefficient of egoistic value on human based view was $\beta = -.07$ which could be mainly originated from the direct effect of these variables on nature based views. Lastly, biospheric values had indirect effect ($\beta = .06$) on personal norm which might be caused from direct effect of this variable on nature based views.

Considering total effects, the strongest positive total effect on personal norm stem from self-identity ($\beta = .66$), while the strongest negative total effect on human based view was originated from the egoistic value ($\beta = -.22$). Self-identity ($\beta = .37$) had the moderated positive total effect on nature based view, had positive and small total effect on human based view ($\beta = .17$). In addition, total effect of Biospheric value on personal norm is positive and high ($\beta = .59$).

Table 67. Direct, indirect and total path coefficients for model of pre-service science teachers

Variables	Egoistic Value			Altruristic Value			Biospheric Value			Nature Based View			Human Based View			Personal Norm		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Self-Identity	.22	-	.22	.43	-	.43	.56	-	.56	.09	.33	.42	-.13	.26	.12	.45	.24	.69
Egoistic Value	-	-	-	-	-	-	-	-	-	-.15	-	-.15	-.20	-.11	-.31	-	-.04	-.04
Altruristic Value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.32	-	.32
Biospheric Value	-	-	-	-	-	-	-	-	-	.66	-	.66	-	.47	.47	-	.16	.16
Nature Based View	-	-	-	-	-	-	-	-	-	-	-	-	.72	-	.72	.25	-	.25
Human Based View	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

4.4. Summary of Results

A model with three sample group including middle school students, pre-service science teachers and science teachers was proposed and tested in the scope of the current study. In the model formed with the base of the theoretical and empirical evidences gathered from the results of the previous studies, the model was explained by the variables for three sample group. Information related to explained total variance is given in Table 69.

Table 68 Information related to Explained Total Variance of the Model

Sample Group	Variance (%)
Middle School Students	80
Pre-Service Science Teachers	68
Science Teachers	59

Table 69 showed that explained total variance in the model from highest to lowest belongs to middle school students (80%), pre-service science teachers (68%) and science teachers (59%) respectively. Considering path models related to self-identity, the strongest positive total effect of self-identity on egoistic value and biospheric value belongs to middle school students while the lowest effect belongs to science teachers. The strongest positive total effect of self-identity on altruistic value belongs to middle school students and pre-service science teachers, while the lowest effect belongs to science teachers. Namely, people in this study who have positive perceptions of themselves about environmental issues were likely to emphasis on the welfare of other people, focuses on nonhuman species or the biosphere and are concerned about all living things including plants and animals. In addition, there is an effect of pre-service science teachers' and science teachers' self-identity beliefs on their nature based views, while there is no significance effect of middle school students' self-identity beliefs on their nature based views. Middle school students' self-identity beliefs are related to their human based views positively, this relationship is negative between pre-service

science teachers' self-identity and human based views. In addition, there is no significant relationship between science teachers' self-identity and human based views. In other words, middle school students who have positive perceptions of themselves about environmental issues tended to have positive human based views, while pre-service science teachers who have positive perceptions of themselves about environmental issues tended to have negative human based views. Lastly, of three sample group' self-identities are related to their personal norms. Namely, people in this study who have positive perceptions of themselves about environmental issues were likely to their expectations related to personal norms that people hold for themselves. Considering effect of egoistic value, its effect on nature based views is almost same for three sample groups, while its effect on human based views is much more negatively at middle school students than pre-service science teachers and science teachers. Middle school students who attach importance to own interests and desires in terms of using natural resources tend to have more human based views. Considering effect of altruistic value, among sample groups, the relationship between altruistic value and nature based view and human based view was found only in terms of middle school students, while effect of altruistic value on personal norm was found in terms of middle school students and pre-service science teachers. Namely, middle school students who emphasis on the welfare of other people were likely to have more nature based view, human based view and their expectations related to personal norms that people hold for themselves. Pre-service science teachers' and science teachers' biospheric values have an effect on their nature based view, while only science teachers' biospheric values have an effect on their personal norms. Similarly, pre-service science teachers' and science teachers' nature based views are related to their human based views and personal norms. Pre-service science teachers and science teachers who have environment focused perceptions tend to their expectations related to personal norms that people hold for themselves. Effects of these variables were presented in Table 70.

Table 69. Direct, indirect and total path coefficients for model of science teachers

Variables	Egoistic Value			Altrusic Value			Biospheric Value			Nature Based View			Human Based View			Personal Norm		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Self-Identity	.14	-	.14	.43	-	.43	.47	-	.47	.22	.15	.37	-	.17	.17	.44	.22	.66
Egoistic Value	-	-	-	-	-	-	-	-	-	-.11	-	-.11	-.15	-.07	-.22	-	-	-
Altrusic Value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Biospheric Value	-	-	-	-	-	-	-	-	-	.35	-	.35	-	-	-	.53	.06	.59
Nature Based View	-	-	-	-	-	-	-	-	-	-	-	-	.60	-	.60	.18	-	.18
Human Based View	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 70. Contrast and compare of middle school students', pre-service science teachers' and science teachers' path models

	Egoistic Value			Altristic Value			Biospheric Value			Nature Based View			Human Based View			Personal Norm		
	MSS	PST	ST	MSS	PST	ST	MSS	PST	ST	MSS	PST	ST	MSS	PST	ST	MSS	PST	ST
Self-Identity	0.24	0.22	0.14	0.55	0.43	0.43	0.59	0.56	0.47	-	0.09	0.22	0.16	-0.13	-	0.41	0.45	0.44
Egoistic Value	-	-	-	-	-	-	-	-	-	-0.1	-0.15	-0.11	-0.48	-0.2	-0.15	-	-	-
Altristic Value	-	-	-	-	-	-	-	-	-	0.61	-	-	0.44	-	-	0.54	0.32	-
Biospheric Value	-	-	-	-	-	-	-	-	-	-	0.66	0.35	-	-	-	-	-	0.53
Nature Based View	-	-	-	-	-	-	-	-	-	-	-	-	-0.21	0.72	0.6	-	0.25	0.18
Human Based View	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note. MSS: Middle School Students, PST: Pre-Service Science Teachers, ST: Science Teachers

CHAPTER 5

CONCLUSIONS, DISCUSSION AND IMPLICATIONS

This chapter consists of findings of present study, discussions and comparison with national and international research studies, implications of the results, limitations of the study and recommendations for future research.

5.1. Conclusion and Discussion of the Results

In this study, a conceptual model was purposed to explain how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity are related to personal norm in a sample of middle school students ($N=3733$), pre-service science teachers ($N=720$) and science teachers ($N=601$). The model assumed that self-identity influence personal norms directly and indirectly through fundamental values and ecological worldviews. In addition, fundamental values have an effect on personal norm directly and indirectly through ecological worldviews. Lastly, it was assumed that ecological worldviews influence personal norms directly. Results across three sample groups showed that ecological worldviews, fundamental values, and self-identity explained 80% of the variance in personal norms in middle school students, 68% of the variance pre-service science teachers and 59% of the variance in science teachers. Main predictor of personal norms was altruistic value for middle school students ($\beta=.54$), self-identity for pre-service science teachers ($\beta=.45$) and biospheric value for science teachers ($\beta=.53$). These results implied that the best predictor variable of personal norm is different for three sample groups. There could be some reasons to explain it. In one of the reasons, after path analysis, it was revealed that since some path coefficients were not statistically significant in the model, these paths were removed from the model.

For example, the relationship between biospheric value and personal norm is not significant for middle school students and pre-service science teachers, even though biospheric value is the best predictor for science teachers. Similarly, the relationship between altruistic value and personal norm is not significant for science teachers, although it is significant for middle school students and pre-service science teachers. Additionally, considering mean values related to altruistic value, biospheric value, self-identity and personal norm, the highest mean value for biospheric value ($M=4.64$) and personal norm ($M=4.51$) belongs to science teachers. Similarly, 98% of science teachers put emphasis on the item of 'respecting the earth' in biospheric value and 97.3% of them believe that it is wrong for them to harm the environment. Accordingly, this result may explain why biospheric value has an influence on personal norm with the highest level for science teachers. Related to this result, in some studies, similar results were found. For example, de Groot and Steg (2007) studied with adults in Czech Republic and found that the best predictor explaining the variance in personal norm is biospheric value. In the current study, as it was mentioned before, altruistic value is main predictor of personal norms for middle school students. Considering the mean values, the lowest mean toward personal norm and altruistic value belongs to middle school students and these means are rather lower than the means of other two sample groups. Accordingly, this result may explain why altruistic value has an influence on personal norm with the highest level for middle school students. One of the reasons why the variance explaining personal norm is different could be that although the best predictor explaining personal norm is different for three sample groups, in some relationships the difference is so small. For example, as mentioned previously, it was found that main predictor of personal norms was self-identity for pre-service science teachers ($\beta=.45$). However, the coefficient of self-identity explaining personal norm is .41 for middle school students and .44 for science teachers. Accordingly, it may be interpreted that 1% and 4% difference could not exactly discriminate the variable explaining personal norm in terms of self-identity.

As far as middle school students are considered, self-identity had medium and direct effect on personal norm in medium level ($\beta=.41$). Self-identity had also indirect and medium effect on personal norm ($\beta =.33$) through egoistic value, altruistic values and nature based views. Thus, middle school students who perceive themselves as high awareness about environmental issues tended to feel moral obligation to perform pro-environmental behaviors or refrain from some actions damaging environment. In addition, altruistic value had a positive, large and direct effect on personal norm ($\beta=.54$) and had indirect and small effect on personal norm ($\beta =.06$) which might be caused from direct effect of this variable on nature based views. However, effect of egoistic value on personal norm ($\beta = -.01$) was small and negative through nature based views. These results mean that students who are likely to emphasis on the welfare of other people feel moral obligation to perform pro-environmental behaviors or refrain from some actions which damage to environment. However, middle school students who attach importance to their interests and desires in terms of using natural resources doesn't feel moral obligation to act environmentally. On the other hand, the relationship between biospheric value and human based views and personal norm was non-significant.

Considering the results in terms of pre-service science teachers, self-identity had medium and direct effect on personal norm ($\beta=.45$). Self-identity had also indirect and small effect on personal norm ($\beta =.24$) through altruistic value, egoistic value, biospheric values and nature based views. Therefore, pre-service science teachers who see themselves as pro-environmental person tended to feel moral obligation to act pro-environmentally or avoid doing harmful behaviors in the environment. In addition, pre-service science teachers' altruistic value had a positive, medium and direct effect on personal norm ($\beta=.32$). Indirect effect of egoistic value on personal norm was $\beta = -.04$ through nature based views. Lastly, biospheric values had indirect effect ($\beta =.16$) on personal norm which might be caused from direct effect of this variable on nature based views. Lastly, nature based views of pre-service science teachers are related to personal norm ($\beta=.25$)

positively with small level. These results imply that pre-service science teachers who are likely to emphasis on the welfare of other people and who focus on non-human species or the biosphere and they are concerned about all living things including plants and animals feel moral obligation to perform pro-environmental behaviors or refrain from some actions which damage to environment. However, pre-service science teachers who attach importance to their interests and desires in terms of using natural resources doesn't feel moral obligation to act environmentally. On the other hand, the relationship between human based views and personal norm was non-significant.

Regarding the results obtained from science teachers, self-identity had medium and direct effect on personal norm in medium level ($\beta=.44$). Self-identity had also indirect and small effect on personal norm ($\beta =.22$) through egoistic value, biospheric values and nature based views. Accordingly, science teachers who see themselves as pro-environmental person tended to feel moral obligation to act pro-environmentally or avoid doing harmful behaviors in the environment. In addition, science teachers' biospheric value had a positive, large and direct effect on personal norm ($\beta=.53$). Biopsheric value had also indirect and small effect on personal norm ($\beta =.06$) which might be caused from direct effect of this variable on nature based views. Indirect effect of egoistic value on personal norm was $\beta = -.04$ through direct effect of egoistic value on nature based views. These results indicate that science teachers who focus on non-human species or the biosphere and they are concerned about all living things including plants and animals feel moral obligation to perform pro-environmental behaviors or refrain from some actions which damage to environment. However, science teachers who attach importance to their interests and desires in terms of using natural resources doesn't feel moral obligation to act environmentally. On the other hand, the relationship between human based views, altrustic value and personal norm was non-significant.

As expected, the result of the current study is in agreement with Stern et al. (1995) statement that is NEP and values are among important factors that may

influence personal norms. In addition, findings of current study across three sample groups are consistent with the studies which examine the effect of self-identity, fundamental values and NEP on personal norm related to environmental issues (e.g., Hunecke et al., 2001; Nordlund & Garvill, 2003; Sahin, 2013; Stern et al., 1999; Yıldırım & Semiz, 2019), while some studies are inconsistent with our study (e.g., Dervişoğlu, Menzel, Soran, & Bögeholz, 2009). Among inconsistent results, for example, Dervişoğlu, et al. (2009) studied with children and investigated the effect of fundamental values, NEP on personal norms for biodiversity protection. The results of the study indicated that fundamental values (egoistic, biospheric and altruistic) and NEP had no significant effect on personal norm. Accordingly, this result is not consistent with our study. It may be resulted from years studies conducted. Their study was conducted at 2006-2007 academic years. The current study was conducted 12 years later and during these years the perspectives of students, culture, and technological improvements can change. A part of some study results is parallel to the current study, while some of them is inconsistent. Among these studies, Sahin (2013) examined how fundamental values, (egoistic, biospheric and altruistic) and NEP are associated with personal norms about household energy conservation and conducted with Turkish pre-service teachers. Similar to current study, the results of her study indicated that egoistic value had a small and negative effect on personal norm ($\beta = -.02$), biospheric value influence personal norm ($\beta = .42$) positively and in medium level and NEP had a small influence on personal norm ($\beta = .08$), but, differently, effect of altruistic value on personal norm ($\beta = -.11$) was small and negative. Consequently, the results showed that pre-service teachers who have chosen environmental quality as a guiding principle in their lives feel more obliged to contribute household energy conservation. Recently, Yıldırım and Semiz (2019) aimed to investigate conceptual model of relationships among pre-service teachers' fundamental values, NEP and personal norms related to sustainable water consumption in a city which is in the east of Turkey. However, the insignificant paths between egoistic value and personal norm and NEP and personal norm were removed. As a result, they found that only biospheric-altruistic

values which were combined since they did not measure distinct factors and violated the discriminant validity were found to be significantly related to personal norm ($\beta = 0.42$). It could be stated that a part of results of their study is consisted with the current study. Steg et al. (2005) examined factors influencing the acceptability of energy policies and found similar findings of the current study. They found that egoistic values had small and negative effect on personal norm, while altruistic values, biospheric values and NEP had small and positive effect on personal norm. However, only biospheric value significantly contributed to the explanation of personal norm. These results implied that people who highly value the quality of the environment feel more obliged to reduce their household energy consumption. Nordlund and Garvill (2003) revealed that more than 40% of the variance in personal norms could be explained by fundamental values. Consistent with the current study results, Chua et al. (2016) found that fundamental values have a direct and indirect effect on personal norm through NEP. In addition, NEP and altruistic value are significantly and positively associated with personal norm accounting for 54.9% of the variance. However, unlike the current study, in their study biospheric value and egoistic value didn't significantly predict personal norm. Consequently, researchers stated that beliefs toward human nature relationship are important in obligation to adopt environmental friendly practices.

Regarding adapting and validating the scales, for NEP scale, according to Confirmatory Factor Analysis, since all the values of χ^2/df are ratio range from 2 to 5 (Tabacnick & Fidell, 2013), indicator of reasonable fit can be emphasized. Since CFI and GFI values are above .90 fit (Bentler, 1990), RMSEA and SRMR values are less than .08 (Hu & Bentler, 1999), all fit indices indicated a good fit for two-structure model of NEP scale. In addition, the value of Standardized (β) Estimates showed that there is a good fit between model and the data. Lastly, internal reliability analysis indicated that Cronbach alpha reliability coefficients of sub-dimensions for NEP ranged from .60 to .68 for three samples. Since these values are above 0.5 which is stated as the minimum value, it could be acceptable

as a measure of reliability (Nunnally, 1967). Previous studies generally reported Cronbach's alpha is $\leq .71$ for NEP (e.g., Grůňová et al., 2018; Harraway et al., 2012; Karpudewan et al., 2012; Ogunbode, 2013). For example, in New Zealand, Harraway et al. (2012) found that The Cronbach alpha values for NEP scale including four factors "Nature provides limited resources; a tendency to recycle", "Nature is susceptible to human interference; a tendency to conserve", "Nature does not exist for the benefit of humans; a tendency to support animal-rights" and "Humans are subject to the laws of nature; a tendency to be cautious about the future" are 0.64, 0.71, 0.60 and 0.51 respectively. Low values were also reported by Wu (2012) ($\alpha=.65$) for Chinese people, by Putu (2017) for Indonesian people ($\alpha=.62$), by Ogunbode (2013) in African sample ($\alpha= 0.61$) and and by Karpudewan et al. (2012) for Malesian people ($\alpha = 0.71$). Most recently for Senegal people, Grůňová et al. (2018) found reliability coefficient as very weak for the scale as a unidimensional measure ($n = 678$; $\alpha=.23$). Studies in Turkey also consist with the current study in terms of low internal consistency (e.g., Taskin, 2009; Erdođan, 2009). For example, Taskin (2009) obtained three sub-dimensions of NEP, "Steady-state economy", "Human exemptionalism paradigm" and "Limits of growth and balance of nature", including diverse alpha values range from .41 to .59. In other study, Erdođan (2009) studied with 1295 undergraduate students from four universities in Turkey and reported the coefficient alpha for 15 items as 0.53.

In this study, fundamental values scale developed by Stern, et al. (1998) was also validated. Since explanatory factor analysis indicate low factor loadings, only Confirmatory Factor Analysis was performed based on the previous studies (e.g., Stern, et al. 1998; Stern, et al. 1999; Stern 2000) and showed three sub-dimensions including Biospheric, Altruistic and Egoistic value. Confirmatory Factor Analysis toward fundamental values scale indicated since all the values of χ^2/df are ratio range from 2 to 5 (Tabacnick & Fidell, 2013), indicator of reasonable fit can be emphasized. Since CFI and GFI values are above .90 fit (Bentler, 1990), RMSEA and SRMR values are less than .08 (Hu & Bentler,

1999), all fit indices indicated a good fit for three-structure model of fundamental values scale. In addition, the value of Standardized (β) Estimates indicated that there is a good fit between model. Lastly, internal reliability analysis indicated that Cronbach alpha reliability coefficients of sub-factors ranged from .65 to .79 for three sample groups. These values can be regarded as acceptable (Nunnally, 1967). In previous studies (e.g., Steg et al. 2005; Stern & Dietz, 1994; Stern, Dietz & Kalof, 1993), similar results were obtained. For example, Steg et al. (2005) found Cronbach's alpha values as .65 for the egoistic, .72 for the altruistic and .83 for the biospheric value. In a Stern, Dietz and Kalof (1993) study, researchers stated that the reliabilities of fundamental values are moderate and indicated internal coefficient of the scale as .66 for the egoistic, .62 for the altruistic and .56 for the biospheric value.

In the current study, it was found that Personal Norm Scale developed by Steg et al. (2005) and Stern et al. (1999) loaded on a single factor. Considering previous studies, similarly, Stern et al. (1999) found that according to explanatory factor analysis toward personal norm, the nine items loaded on a single factor which accounted for 52 percent of the variance. Steg et al. (2005) used the scale as one factor. In addition, in many studies (e.g., Stern, et al. 1995; Stern, 2000) personal norm was used as a single factor. Results of internal consistency in the current study showed that the alpha value of Personal Norm scale range from .80 to .88 for three sample groups. These values can be regarded as acceptable (Nunnally, 1967). Consistent with the current study results, Stern et al. (1999) stated that personal norm scale including 9 items has an alpha reliability of .88. In addition, Steg et al. (2005) found Cronbach's alpha value as .84 for Personal Norm Scale.

In the current study, it was found that Self-Identity Scale loaded on a single factor. Previous researchers (e.g., Cook et al., 2002; Fielding et al., 2008; Terry, Hogg & White, 1999; Sparks & Shepherd 1992; Van der Werff et al. 2013) also used with a single factor of Self-Identity Scale. Results of internal consistency in the current study showed that the Cronbach alpha values range from .83 to .90 for three sample groups. These values can be regarded as acceptable (Nunnally,

1967). Considering the previous studies, Whitmarsh and O'Neill (2010) measured Self-Identity Scale and found a reliable scale ($\alpha = .70$). Similarly, Van der Werff et al. (2013) conducted their studies with three steps and reliability values range from .82 to .88.

One more aim in the current study was to investigate middle school students' pre-service science teachers' and science teachers' ecological worldviews, fundamental values, personal norms and self-identities. Among the sample, in the first step, middle school students' ecological worldviews were examined. The mean scores of most items in the present study were above 3, with a scale mean score of 3.49. Middle school students' responses produced more mean score of for nature based views ($M=3.82$) than for human based views ($M=3.16$). These results revealed that middle school students tend to have moderate level ecological worldviews and more positive views toward nature based views than human based views. For example, considering items in terms of 'Human Based' factor, middle school students (53.9%) believe that humans don't have the right to modify the natural environment to suit their needs. Less than half of them (41.7%) agree that human ingenuity will insure that we do not make the earth unlivable. Regarding items involved in the factor of 'Nature Based', Almost three quarters of middle school students' (70.5%) believe that humans are severely abusing the environment. Many of them (86.30%) think that plants and animals have as much right as humans to exist.

These results show parallelism with those of previous studies in children (e.g., Corraliza, et al., 2013; Manoli et al., 2007; Pauw et al., 2011; Pauw & Petegem, 2012; Petegem & Blicek, 2006; Wu, 2012) Among previous studies, Manoli et al. (2007) studied with 515 fourth-, fifth-, and sixth-grade students and obtained children' average score as 3.58 on the NEP. In one more study, Corraliza, et al. (2013) found that children whose ages are ranged from 8 to 13 years-old in Spain had mostly eco-centric beliefs than human dominance). In Wu' (2012) study, 507 students (age 10 to 12 years old) were involved in the study and found that the mean scores of most items in the current study were above 3, with a scale

mean score of 3.94. Most of the respondents (78.7%) strongly agreed with item 9 (anti exemptionalism), on the other hand, about 51.2% of the respondents agreed that there would be enough resources on earth if humans learned how to exploit them, while more than 75% of the respondents agreed that the earth had very limited space and resources. In some studies supporting the current study, students' ecological worldviews were compared in terms of countries. Among them, in a study conducted by Pauw and Petegem (2012), it was obtained that Belgian children are more in favour of the NEP worldview than the children in Vietnam and in Zimbabwe, indicating that Belgian children display pro-ecological conceptions more than children from Vietnam, and that children from both countries display pro-ecological conceptions more than children in Zimbabwe. Petegem and Blicek (2006) found that students in Zimbabwe have more mean score than students in Belgium, while in the dimension of Balance of nature, students ($M=4.10$) in Belgium have more mean score than students in Zimbabwe ($M=3.71$). These results showed that students in Belgium believe in human–nature equality, while Zimbabwean students feel more dominant over nature.

In the second step, pre-service science teachers and science teachers' ecological worldview were examined. Results indicated that pre-service science teachers' responses produced a mean score of 3.65 for human based views and 3.89 for nature based views revealing that pre-service science teachers tend to have more positive views toward nature based than human based views. For example, considering items in terms of 'Human Based' factor, pre-service science teachers (66%) believe that humans don't have the right to modify the natural environment to suit their needs. More than half of them (67.4%) agree that human ingenuity will insure that we do not make the earth unlivable. Regarding items involved in the factor of 'Nature Based', a great majority of them (91.1%) think that plants and animals have as much right as humans to exist. A vast majority of them (85.80%) think that if things continue on their present course, we will soon experience a major ecological catastrophe. Considering science teachers,

ecological worldviews were engaged mostly by nature based views. In addition, these views were engaged mostly by female science teachers for both human based views ($M=3.83$) and nature based views ($M=3.96$) than males' human based views ($M=3.78$) and nature based views ($M=3.93$). Considering the literature, many studies supported the results of this study (e.g., Goldman et al., 2014; Karpiak & Baril, 2008; Putu, 2017). In one of them, Karpiak and Baril (2008) indicated that university students adopt more eco-centric views compared to anthropocentric ones. Their results revealed that the students from biological science departments exhibit more eco-centric and less anthropocentric attitudes than the students of other departments. An explanation was made by the researchers as that studying biology might have a decreasing effect in terms of anthropocentric attitudes since it leads an in-depth understanding of the nonhuman life. In a study conducted by Putu (2017), there were 92 pre-service teachers who enrolled courses related to environmental education (i.e., environmental introduction and general ecology) and attended the study in Indonesia. The total means for NEP scale were above 3 which mean that pre-service teachers have pro-environmental beliefs. In a research conducted by Goldmana et al. (2014), chemical engineering students' views related to relationship between human and nature were aimed to obtain in the scope of science education by using NEP scale. The results of their study showed that the mean score of full NEP scale was 3.51 which mean a moderately eco-centric orientation. The mean value is 3.58 for anti-anthropocentrism, and 3.35 is for rejection of exemptionalism. Considering the scope of studies in Turkey, it is seen that similar results were also obtained (e.g., Alagoz & Akman, 2016; Alper, 2014; Aydos & Yağcı, 2015). Among them, in Alper' (2014) study, Turkish pre-service science teachers seemed to give value to nature for the sake of the nature itself, rather than for the benefits of human being. In Aydos and Yağcı' (2015) study, pre-service science teachers' mean score for eco-centric views is 33.69, while the mean score for anthropocentric views is 21.48. In one more study conducted in Turkey, Alagoz and Akman (2016) obtained that the averages of the students were higher in questions measuring the eco-centric approach within the

NEP scale. Considering the mean scores of three samples group toward sub-dimension of NEP scale, mean scores of science teachers for Nature Based view is higher than pre-service science teachers and middle school students. In addition, science teachers' mean scores toward human Based views are higher than pre-service science teachers and middle school students.

Regarding fundamental values, results showed that middle school students' responses produced a mean score of 3.40 for egoistic value, 4.42 for altruistic value and 4.47 for biospheric value. Similarly, pre-service science teachers have a mean score of 3.61 for egoistic value, 4.58 for altruistic value and 4.60 for biospheric value. According to results obtained from science teachers, the mean score on 'Egoistic Value' factor was calculated as 3.46, the mean score on 'Altruistic Value' factor was calculated as 4.52 and the mean score on 'Biospheric Value' factor was calculated as 4.64. These results showed that middle school students, pre-service science teachers and science teachers put an emphasis on the welfare of other people and concerned about environment and pay attention to all preferences for nature. In addition, it is likely to state that they don't attach importance to their own interests and desires in terms of using natural resources. Findings of current study are consistent with the previous studies (e.g., de Groot and Steg, 2008). In one of them, de Groot and Steg (2008) conduct their studies with three steps. In the first study, there were 112 participants in Netherlands. In the second study, 490 participants were involved. In the third study, a total of 184 people in University of Groningen involved in the study. The results of first study showed that the mean score of egoistic value is lower than mean score of biospheric value and altruistic value. In the second study, similar results were obtained and finally, third study also indicated parallel results. In one more study, Steg et al. (2011) conducted their study with two study groups. Firstly, 490 people people in five European countries were involved in the study. They found that people had low egoistic value, while they had high altruistic value score and high biospheric value score. In the second sample group, a total of 298 university students in a Dutch University in Netherlands in 2005 attended the study. The

mean score of egoistic value is lower than mean score of biospheric value and altruistic value. In Yıldırım and Semiz' (2019) study conducted in Turkey, they found that pre-service teachers' mean scores for altruistic value and biospheric value were higher than their egoistic value. It means that, they appeared to attribute a higher value to the impact of environmental problems on non-human beings and other people. Considering the mean scores of three samples group toward sub-dimension of Fundamental Values scale, mean score of biospheric is the highest value and mean score of altruistic value is higher than mean score of egoistic value for three sample group. In addition, when comparing the in terms of sample group, it is seen that the mean score of pre-service science teachers is highest value for egoistic and altruistic value, while the mean score of science teachers is highest value for biospheric value.

Another variable involved in the first research question is personal norm. Middle school students' responses produced a mean score of 4.19, the mean value of pre-service science teachers' personal norms is 4.45 and the mean value of science teachers' personal norms is 4.51. These results indicated that science teachers have higher personal norm value than pre-service science teachers and middle school students. The last variable in the study is self-identity. Results showed that middle school students' responses produced a mean score of 3.94, the mean value of pre-service science teachers' self-identity is 4.08 and the mean value of science teachers' self-identity is 4.32. These results showed that science teachers have higher self-identity value than pre-service science teachers and middle school students.

Regarding results obtained from NEP, fundamental values, self-identity and personal norm, science teachers had the highest mean scores in comparison with middle school students and pre-service science teachers. It could be because science teachers have more experience toward human-nature relationship and they teach these topics in their science courses. For example, in the science curriculum in elementary school in Turkey, within the environmental issues, providing environmental awareness, preventing environmental pollution,

calculating the ecological footprint and providing suggestions for solving environmental problems are among the most anticipated objectives (Council of Higher Education, 2018). In the curriculum, being aware of the relationship between human and nature, recognizing the harmful effects of humanity on nature and discussing the ways of minimizing such damage, learning the current issues such as global warming and greenhouse gas, gaining recycling habit and the importance of saving are also remarkable as the expected objectives from the students. One more reason could be that science teachers attend in-service training during their occupational experience. Before teaching profession, pre-service science teachers learn environmental issues including population growth, ecological impact, soil and water resources and environmental awareness in some courses such as environmental education, education for sustainable education during their education at university. Accordingly, pre-service science teachers can gain awareness toward the relationship between human and nature. Although middle school students learn environmental issues in accordance with elementary science curriculum, their awareness toward human nature relationship could be lower than pre-service science teachers and science teachers because they are younger, have lack of knowledge or experience. Consistent with these results, Liere and Dunlap (1980) proposed some hypotheses affecting environmental awareness. Result of some studies showed that when age is increased, ecological worldviews also increase since their experiences with nature along with their knowledge about environmental issues also increase (Hawcroft & Milfont, 2010; Liere & Dunlap, 1980; Pienaar et al., 2013; Pienaar et al., 2015). While some researchers found that people who have high-income and education level have fewer consensuses that the environment is fragile, people who have higher levels of education have also high pro-ecological views which is consistent with previous studies (Cottrell, 2003; Hawcroft & Milfont, 2010; Liere & Dunlap, 1980). One more point to consider is related to explained variance. Although science teachers had the highest mean values for the scales, explained variance of variables of ecological worldviews, fundamental values, and self-identity on personal norms is lowest level and these variables explained the highest level of

the variance on personal norms for middle school students in comparison with pre-service science teachers and science teachers. These results related to explained variance imply that students' personal norms depend on their ecological worldviews, fundamental values, and self-identities more than pre-service science teachers and science teachers.

5.2. Implications of the Study

The present study attempted to determine middle school students' pre-service science teachers' and science teachers' ecological worldviews, fundamental values, personal norms and self-identities and a conceptual model was purposed to explain how ecological worldviews (human based and nature based), fundamental values (egoistic, biospheric and altruistic) and self-identity related to personal norms. Findings in the study have important theoretical and practical implications.

The results indicate that fundamental values, ecological worldview, and self-identities are related personal norms. This suggests that future studies can be aimed to understand and change fundamental values, ecological worldview, self-identities and personal norms, and how people can be motivated to behave their psychological characteristics. These results conflict with assumptions included Value Belief Norm Theory, which present that NEP is more strongly related to personal norms than are values as the NEP focuses on only ecological issues (Stern 2000). Value Belief Norm theory supposes that values precedes NEP and that the NEP precedes personal norms. All variables are expected to affect variables causal chain indirectly as well as directly, but relations are supposed to be weaker since variables are further apart in the causal chain. Yet, the results showed that values are more strongly associated with personal norms, than is the NEP. In general, the NEP did not significantly contribute to the explanation of the variance in personal norm. The value scale used in the present study seems to be a reliable, valid and parsimonious scale that is suitable for understanding relation between values, personal norms and self-identity. This study exhibited

that fundamental values can account for an important proportion of the variance in these variables. The prediction power of this value scale is analogous to, and often even better than, that of more wide range of scales based on Schwartz's values scale (e.g., Karp, 1996; Nilsson, Von Borgstede, & Biel 2004).

One of the implications offered by this study is the consideration of the importance of the middle school students' gaining awareness to ecological worldviews, fundamental values, personal norms and self-identities in the elementary schools. This study indicated that students' beliefs, values, and norms can be regarded as one of the important components of human-nature relationship. Middle school students in the present study found to have less adequate environmental awareness including NEP, fundamental values, personal norms and self-identity than pre-service science teachers and science teachers. As the research put forward, nearly all the grade level in elementary schools in Turkey, subjects related to environmental issues are involved in the curriculum. Teachers should pay more attention to the teaching of local and global environmental issues, as well as basic ecological concepts. Therefore, educators and researchers should be aware of these psychological variables and their importance in students' education. In addition, studies toward developing students' beliefs, values, personal norms and self-identity toward environment in the elementary science program should be enhanced by the support of the professionalist and academiciens in the field of environmental pyschology.

Even though these results indicated that pre-service science teachers are more conscious than middle school students about human-nature relationship, it can be more useful if curriculum developers and academic staff should pay more attention to the teaching of local and global environmental issues, as well as basic ecological concepts. Furthermore, the number of courses related to the ecological issues should be enhanced. While pre-service science teachers are still undergraduate and the intended fundamental values, ecological worldviews, personal norms and self-identity is tried to being reached with the help of courses abovementioned, the university should also provide the necessary equipment with

the pre-service science teachers so that they could meet their needs and be motivated to act some activities in nature.

Considering in terms of teacher education, results indicated that science teachers are better ecological awareness than middle school students and pre- service science teachers. However, student education related to environmental issues is important and was provided by science teachers in elementary school curriculum. In addition, teachers, educators, researchers, and policy makers may collaborate for this purpose organizing small workshops and meetings as a part of their in-service trainings. Teachers should be provided with seminars about the special teaching methods and instructional strategies and how to use them in the classroom for developing the students' beliefs, values, personal norms and self-identity toward environment. In addition, teachers should emphasize the human-nature relationship while designing the classroom activities and choosing the instructional methods for science lessons.

With the study, valid and reliable scales were presented and a successful model was provided with the study for three sample group. Therefore, further researchers can use the scales and the proposed model which can contribute the relevant literature and their studies. This study can also contribute to Environmental Education and Environmental Psychology literature.

5.3.Limitations and Recommendation for Further Research

Although the present study has provided contribution in middle school students, pre-service science teacher and science teacher literature, it has a few remarkable limitations which should be considered in future research. The first limitation is related to the measurement of the constructs within the study. Relying on the self-reported questionnaires and trusting in the self-reported levels of the related constructs as indicated by the participants is one of the weaknesses in this study. Although it was supposed that participants completed the scale accurately and seriously, self-report measures can sometimes mislead the results of the study. Moreover, further research using qualitative approach could be useful to detect

underlying causes of the relationship among variables of the current study. For example, middle school students, pre-service science teacher and science teachers' ecological worldviews, fundamental values, personal value and self-identity can be measured by semi-structured interviews. In addition, some misunderstanding parts of scales can be detected with interviews. Especially, some of students can't comprehend all the statements in the scales especially in NEP scales. Because, NEP scale used in the study was developed by adults not for children, even there is a NEP scale developed by children. In addition, conducted further experimental and longitudinal studies may supply clear causal associations among the variables of the study. For example, with the given education to students by using experimental research designs, students' ecological awareness can be gained as mentioned by Izadpanahi et al. (2017). Students' and pre-service science teachers' development in environmental issues can be measured for each grade year by using longitudinal studies. The current study is limited to several cities in specific geographical region. Therefore, it is not possible to generate all results to Turkey. Further study can be conducted in different geographical region to make generalization for Turkey. It is also suggested that future research should look more thoroughly considering regional differences. In addition, cross-cultural studies might be performed to see differences between middle school students' pre-service science teachers' and science teachers' fundamental values, ecological worldviews, personal norms and self-identity and that of other countries' participants'. Since the variables in the current study is limited, further studies can enhanced the number of psychological variables such as behavior, locus of control, subjective or social norm, attitude, perceived behavioral control, knowledge and demographic variables such as gender, age, education and income. Since the results of the current study will be base for future studies, it is worthwhile to move on this line of research to extend related literature and provide more detailed picture on these variables.

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APPENDICES

A: Permission of METU Human Subjects Ethics Committee

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER



ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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Sayı: 28620816 / 227

05 NİSAN 2018

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Prof.Dr. Ceren ÖZTEKİN

Danışmanlığını yaptığınız doktora öğrencisi Hüseyin ATEŞ' in "*Ortaokul Öğrencilerinin, Fen Bilimleri Öğretmen Adaylarının ve Fen Bilimleri Öğretmenlerinin Ekolojik Dünya Görüşleri: Karşılaştırmalı Bir Çalışma*" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **2018-EGT-048** protokol numarası ile **06.04.2018 - 30.09.2019** tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN

Başkan V

Prof. Dr. Ayhan SOL

Üye

Prof. Dr. Ayhan Gürbüz DEMİR

Üye

Doç. Dr. Yaşar KONDAKÇI

Üye

Doç. Dr. Zana ÇITAK

Üye

Doç. Dr. Emre SELÇUK

Üye

Dr. Öğr. Üyesi Pınar KAYGAN

Üye

B: Permissions Obtained From Ministry of National Education



T.C.
MİLLÎ EĞİTİM BAKANLIĞI
Temel Eğitim Genel Müdürlüğü

Sayı : 70297673-605.01-E.10107985
Konu : Tez Önerisi

24.05.2018

ORTA DOĞU TEKNİK ÜNİVERSİTESİNE

- İlgi: a) Orta Doğu Teknik Üniversitesinin, Genel Müdürlüğümüzde 18/05/2018 tarihinde ve 9756179 sayıda işlem gören yazısı.
b) Millî Eğitim Bakanlığının 22/08/2017 tarihli ve 2017/25 sayılı Genelgesi

Üniversiteniz Eğitim Fakültesi İlköğretim Anabilim Dalı doktora programı öğrencisi Hüseyin ATEŞ'in, Prof. Dr. Ceren ÖZTEKİN'in danışmanlığında yürütmekte olduğu "Ortaokul Öğrencilerinin, Fen Bilimleri Öğretmen Adaylarının ve Fen Bilimleri Öğretmenlerinin Ekolojik Dünya Görüşleri: Karşılaştırmalı Bir Çalışma" konulu çalışma talebi hakkındaki ilgi (a) yazı ve ekleri Genel Müdürlüğümüzde oluşturulan komisyon tarafından incelenmiştir.

Söz konusu araştırmanın eğitim ve öğretimi **aksatmayacak** şekilde **gönüllülük** esasına dayalı olarak uygulanması, uygulamalarda **sadece** yazımız ekinde gönderilen **mühürlü veri toplama araçlarının** kullanılması, araştırma sonucunda elde edilen kişisel verilerin **gizliliği** hususuna dikkat edilmesi, geliştirilmesi planlanan veri toplama araçları (varsa) için uygulanmalarına yönelik ilerleyen süreçte tekrar izin alınması, araştırma sonucunda elde edilen raporun, basılı ve dijital ortamda Genel Müdürlüğümüze teslim edilmesi gerekmektedir. Bu çerçevede araştırmanın Genel Müdürlüğümüze bağlı ortaokullarda yürütülmesinde herhangi bir sakınca bulunmamaktadır.

Bilgilerinizi ve gereğini rica ederim.

Tuncay MORKOÇ
Bakan a.
Genel Müdür V.

Ekler:

- 1-Mühürlü Anket Formu 6 sayfa)
2-İlgi (a) yazı

DAĞITIM:

Gereği:
Orta Doğu Teknik Üniversitesine
(ek konuldu Mühürlü anket Formu 6 sayfa)

Bilgi:
Ankara, Kırşehir, Kayseri, Manisa
Valiliklerine (İl Millî Eğitim Müdürlükleri)
(Bilgi amaçlı olup, cevabi yazı
gönderilmeyecektir)

Atatürk Blv. 06648 Kızılay/ANKARA
Elektronik Ağ: www.meb.gov.tr
e-posta: adsoyad@meb.gov.tr

Ayrıntılı bilgi için: M. AKARSU Şef
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T.C.
KIRŞEHİR AHİ EVRAN ÜNİVERSİTESİ
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E.00000070860



Sayı : 15559425-2434 - 005099
Konu : Anket Uygulama İzni

MATEMATİK VE FEN BİLİMLERİ EĞİTİMİ BÖLÜM BAŞKANLIĞINA

Orta Doğu Teknik Üniversitesi öğrencisi Hüseyin ATEŞ'in "Ortaokul Öğrencilerinin, Fen Bilimleri Öğretmen Adaylarının ve Fen Bilimleri Öğretmenlerinin Ekolojik Dünya Görüşleri: Karşılaştırmalı Bir Çalışma" başlıklı çalışmayı Bölümünüz Fen Bilgisi Eğitimi Anabilim Dalı Öğretmen Adaylarından veri toplaması uygun görüldüğüne ilişkin, Rektörlük Makamından alınan 31.05.2018 tarihli ve 67873788-2434 - 005099/00000070611 sayılı yazı ekte gönderilmiştir.

Bilgilerinizi ve gereğini rica ederim.

e-İmzalıdır
Dr. Öğr. Üyesi Cahit AYTEKİN
Dekan Yardımcısı

Ek:
1- Anketler (Hüseyin ATEŞ)
2- Ek Evraklar

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D: Permissions Obtained from Erciyes University

Evrak Tarih ve Sayısı: 31/05/2018-E.10280



T.C.
ERCİYES ÜNİVERSİTESİ REKTÖRLÜĞÜ
Personel Daire Başkanlığı

Sayı :62637355/604.01.01/E. 10280
Konu :Başvurular ve Proje Önerileri

31/05/2018

ORTA DOĞU TEKNİK ÜNİVERSİTESİ REKTÖRLÜĞÜNE
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İlgi : 14/05/2018 tarihli ve 54850036-044-2433/005098 sayılı yazınız.

Üniversiteniz Eğitim Fakültesi İlköğretim Anabilim Dalı doktora öğrencisi Hüseyin ATEŞ'in, ilgi yazınız ve ekleri içeriğinde anılan çalışmasını yapabilmesi için gereğinin yapılması ilgi yazınızla istenilmektedir.

Adı geçen öğrencinin, Üniversitemiz Eğitim Fakültesi fen bilimleri öğretmen adaylarından veri toplama uygulaması yapma isteği kişinin bizzat kendisi tarafından gerçekleştirilmesi kaydıyla Rektörlüğümüzce uygun görülmüştür.

Bilgilerinizi arz ederim.

e-imzalıdır

Prof.Dr. Muhammet GÜVEN
Rektör

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T.C.
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ORTA DOĞU TEKNİK ÜNİVERSİTESİ REKTÖRLÜĞÜNE

İlgi : 14/05/2018 tarihli ve 5096 sayılı yazı.

Üniversiteniz Sosyal Bilimler Enstitüsü, Matematik ve Fen Bilimleri Eğitimi Anabilim Dalı, İlköğretim Programı Doktora Öğrencisi Hüseyin ATEŞ'in, Prof.Dr. Ceren ÖZTEKİN'in danışmanlığında yürüttüğü "Ortaokul Öğrencilerinin, Fen Bilimleri Öğretmen Adaylarının ve Fen Bilimleri Öğretmenlerinin Ekolojik Dünya Görüşleri: Karşılaştırmalı Bir Çalışma" isimli tezi kapsamında uygulama yapma talebine ilişkin Üniversitemiz Gazi Eğitim Fakültesi Dekanlığının yazısı ekte gönderilmektedir.

Bilgilerinizi ve gereğini arz ederim.

e-İmzalıdır
Prof. Dr. Yaşar AYDEMİR
Rektör a.
Rektör Yardımcısı

Ek: Görüş yazısı.



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Bilgisayar İşletmeni

F:Gönüllü Katılım Formu

Bu araştırma kapsamında katılımcıların insan ve doğa etkileşimine yönelik düşüncelerini almak amaçlanmıştır. Çalışmaya katılım gönüllülük esasına dayanmaktadır. Veri toplama sürecinde, sizden kimlik belirleyici hiçbir bilgi istenmeyecektir. Sadece çalışma başlangıcında sizden bazı demografik bilgiler istenecektir. Bu demografik bilgiler araştırma raporunda katılımcıların yaş, gelir düzeyi gibi özelliklerini betimlemek için gereklidir. Cevaplarınız tamamen gizli tutulacak ve sadece araştırmacı tarafından değerlendirilecektir; elde edilecek bilgiler bilimsel yayınlarda kullanılacaktır.

Çalışmanın veri toplama süreci sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederim.

Hüseyin ATEŞ

İletişim

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Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayınlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

İsim Soyisim

Tarih

İmza

----/----/-----

G: Veli Onay Formu

Sevgili Anne/Baba,

Bu çalışma Orta Doğu Teknik Üniversitesi doktora öğrencisi Hüseyin ATEŞ tarafından yürütülmektedir.

Bu çalışmanın amacı nedir? Bu araştırma kapsamında ortaokulda eğitim gören öğrencilerin insan ve doğa etkileşimine yönelik düşüncelerini almak amaçlanmıştır.

Çocuğunuzun katılımcı olarak ne yapmasını istiyoruz?: Bu amaç doğrultusunda, çocuğunuzun insan ve doğa etkileşimine yönelik düşüncelerini belirlemek amacıyla bazı anket maddelerini doldurmalarını istiyoruz. Çocuğunuzun içinden geldiği gibi verilen maddeleri incelemesi bizim için yeterlidir.

Çocuğunuzdan alınan bilgiler ne amaçla ve nasıl kullanılacak?: Çocuğunuzdan alacağımız cevaplar tamamen gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir. Elde edilecek bilgiler sadece bilimsel amaçla doktora tez çalışmasında kullanılacak, çocuğunuzun ya da sizin isim ve kimlik bilgileriniz, hiçbir şekilde kimseyle paylaşılmayacaktır.

Çocuğunuz ya da siz çalışmayı yarıda kesmek isterseniz ne yapmalısınız?: Katılım sırasında sorulan sorulardan ya da herhangi bir uygulama ile ilgili başka bir nedenden ötürü çocuğunuz kendisini rahatsız hissettiğini belirtirse, ya da kendi belirtmese de araştırmacı çocuğunuzun rahatsız olduğunu öngörürse, çalışmaya sorular tamamlanmadan derhal son verilecektir.

Bu çalışmayla ilgili daha fazla bilgi almak isterseniz: Çalışmaya katılımınızın sonrasında, bu çalışmayla ilgili sorularınız yazılı biçimde cevaplandırılacaktır. Çalışma hakkında daha fazla bilgi almak için elektronik posta yoluyla Hüseyin ATEŞ ile (huseyinat_38@hotmail.com) iletişim kurabilirsiniz. Bu çalışmaya katılımınız için şimdiden teşekkür ederiz.

Yukarıdaki bilgileri okudum ve çocuğumun bu çalışmada yer almasını onaylıyorum
(Lütfen alttaki iki seçenekten birini işaretleyiniz.)

Evet onaylıyorum___

Hayır, onaylamıyorum___

Velinin adı-soyadı: _____

Bugünün Tarihi: _____

Çocuğun adı soyadı ve doğum tarihi: _____

H: Ecological Worldview Scale (Science Teachers)

Değerli Fen Bilimleri Öğretmeni,

Bu araştırma kapsamında sizlerin insan ve doğa etkileşimine yönelik düşüncelerinizi almak amaçlanmıştır. Elde edilen bulgular araştırma kapsamı dışında başka bir amaç için kullanılmayacaktır. Araştırmadaki elde edilen sonuçların geçerliliği, sizin bu ankete içten ve gerçek yanıtlar vermenize bağlıdır. Bu nedenle, lütfen soruları dikkatle okuyunuz ve sizin görüşlerinizi en iyi yansıtan seçeneği işaretleyiniz. İlgi ve yardımlarınız için şimdiden çok teşekkür ederiz.

Kişisel Bilgiler

1. Cinsiyetiniz: Kadın Erkek
2. Medeni haliniz: Evli Bekar
3. Hangi yılda doğdunuz:
 - a. Mezun olduğunuz üniversite.....
 - b. Mezun olduğunuz fakülte.....
 - c. Mezun olduğunuz bölüm.....
 - d. Çevre ile ilgili hizmet içi eğitime/ seminere katıldınız mı?
 Evet Hayır
4. Kaç yıldır öğretmenlik yapıyorsunuz?
5. Şu anda yaşadığınız şehir:.....
6. Okulunuzun adı:
7. Derslerine girdiğiniz sınıfların ortalama sınıf mevcudu:.....
8. Çevre sorunları ile ne kadar ilgilisiniz?
 Çok fazla Biraz Çok az Hiç
9. Çevre konuları ve problemleri ile ilgili, genel olarak, ne kadar bilginiz olduğunu düşünüyorsunuz?
 Çok Yeteri kadar Biraz Fikrim yok Bilmiyorum
10. Aşağıdakilerden hangisi sizin görüşünüze en yakındır?
 Çevre problemleri, günümüzde insanların karşı karşıya olduğu en önemli 2 ya da 3 problemden biridir.
 Çevre problemleri önemlidir, ama daha başka önemli problemler de vardır.
 Çevre problemleri önemli **değildir**.
 Çevre problemlerini problem olarak **görmüyorum**.
11. Türkiye'deki çevre problemleri çok abartılıyor.
 Kesinlikle Katılmıyorum Katılmıyorum Kararsızım Katılıyorum Kesinlikle Katılıyorum
- 12.

Çevre ile ilgili bilgileri <u>en çok</u> nereden ediniyorsunuz?	Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılmıyorum
Gazete ve dergilerden	5	4	3	2	1
İnternet sitelerini ziyaret ederek	5	4	3	2	1
Televizyon/radyo programlarını izleyerek	5	4	3	2	1
Çevre ile ilgili yürütülen gönüllü çalışmalara katılarak	5	4	3	2	1
Ders kitaplarından	5	4	3	2	1
Arkadaşlarımdan	5	4	3	2	1
Diğer (Belirtiniz)					

Aşağıda yer alan ifadelere ne derece katılıyorsunuz?		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
1	İnsanlar ihtiyaçlarını karşılamak için doğayı değiştirme hakkına sahiptirler.	5	4	3	2	1
2	İnsanların doğaya müdahalesi genellikle felaketle sonuçlanır.	5	4	3	2	1
3	İnsan zekâsı ve yetenekleri Dünyanın bozulmayacağına garantisidir.	5	4	3	2	1
4	İnsanlar doğaya çok kötü davranıyor.	5	4	3	2	1
5	Dünyada herkese yetecek miktarda doğal kaynak vardır, yeter ki bu kaynaklardan nasıl yararlanacağımızı bilelim.	5	4	3	2	1
6	Bitki ve hayvanlar da, insanlar kadar yaşama hakkına sahiptir.	5	4	3	2	1
7	Doğanın dengesi, modern endüstri toplumlarının etkileri ile rekabet edebilecek güçtedir.	5	4	3	2	1
8	Bizi diğer canlılardan üstün kılan özel yeteneklerimize rağmen, hala doğa yasaları ile mücadele ediyoruz.	5	4	3	2	1
9	İnsanlığın karşı karşıya kaldığı "ekolojik kriz" olarak adlandırılan olaylar çok abartılıyor.	5	4	3	2	1
10	Dünya, sınırlı alan ve kaynaklara sahip olan bir uzay gemisine benzer.	5	4	3	2	1
11	İnsan olmak doğanın geri kalan bölümüne hükmetmek demektir.	5	4	3	2	1
12	Doğanın dengesi çok hassastır ve kolayca bozulabilir.	5	4	3	2	1
13	İnsanlar, doğayı kontrol edebilmek için doğayı anlamak gerektiğini eninde sonunda öğrenecekler.	5	4	3	2	1
14	Eğer her şey bugünkü gibi devam ederse, yakında büyük bir ekolojik felaket ile karşı karşıya kalacağız.	5	4	3	2	1
15	Dünyanın, insan yaşamını destekleme kapasitesini doldurmak üzereyiz.	5	4	3	2	1
Aşağıdaki unsurların, KENDİ HAYATINIZI YÖNLENDİRİRKEN sizin için ne kadar önemli olduğunu verilen ölçüte göre [Hiç önemli değil (1) – Son derece önemli (5)] lütfen belirtiniz. (Temel Değerler)		Son Derece Önemli	Önemli	Kararsızım	Önemli Değil	Hiç Önemli Değil
1	Otorite sahibi olmak (liderlik yapma hakkı)	5	4	3	2	1
2	Başkalarına hükmetmek/ onları kontrol etmek (Sosyal güç)	5	4	3	2	1
3	Mal mülk ve para sahibi olmak (Zenginlik)	5	4	3	2	1
4	İkna edici olmak / (insanlar ve olaylar üzerinde etkili olmak)	5	4	3	2	1
5	Haksızlıkları düzeltmek, güçsüzlere yardım etmek (Sosyal adalet)	5	4	3	2	1
6	Yardımseverlik (Başkalarının refahı için çabalamak)	5	4	3	2	1
7	Barış içinde bir Dünya (savaşsız ve çatışmasız bir Dünya)	5	4	3	2	1
8	Herkes için eşit fırsatlar sağlamak (Eşitlik)	5	4	3	2	1
9	Doğa ile bütün olmak (doğaya uyum sağlamak)	5	4	3	2	1
10	Yeryüzüne saygı duymak (diğer türlerle uyum)	5	4	3	2	1
11	Çevreyi korumak (doğayı gözetmek)	5	4	3	2	1
12	Çevre kirliliğinin önlenmesi	5	4	3	2	1
Aşağıda yer alan ifadelere ne derece katılıyorsunuz? (Kişisel Normlar)		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
1	Başkalarının davranışlarına bakmaksızın, doğayı korumakla yükümlü olduğumu hissediyorum	5	4	3	2	1
2	Çevre kirliliğini durdurmak adına harekete geçmek için istekliyim.	5	4	3	2	1
3	Çevreye zarar vermek benim açımdan yanlıştır .	5	4	3	2	1
4	Doğal yaşama zarar verirsem kendimi suçlu hissederim.	5	4	3	2	1
5	Doğayı korumak benim kişisel sorumluluğumdur.	5	4	3	2	1
6	Doğayı korumak için herkes sorumluluk almalıdır.	5	4	3	2	1
7	Kendimi doğaya, diğer canlılara karşı yükümlü hissettiğim için doğaya zarar vermekten kaçınıyorum .	5	4	3	2	1
8	İklim değişikliğini önlemek için elimden gelen her şeyi yapmak benim kişisel sorumluluğumdur.	5	4	3	2	1
9	Yaşam tarzımı değiştirmek zorunda olmadığım sürece çevreyi korumak için elimden gelenin en iyisini yaparım.	5	4	3	2	1
Aşağıda yer alan ifadelere ne derece katılıyorsunuz? (Öz-Kimlik)		Kesinlikle Katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle Katılmıyorum
1	Kendimi doğa dostu biri olarak görüyorum.	5	4	3	2	1
2	Çevre korumacı davranış sergilemek, kim olduğumun önemli bir parçasıdır.	5	4	3	2	1
3	Çevre dostu davranışlar sergileyen biriyim.	5	4	3	2	1
4	Kendimi çevre problemleri ile ilgili biri olarak görüyorum.	5	4	3	2	1
5	Kendimi çevre dostu bir tüketici olarak görüyorum	5	4	3	2	1

I: Ecological Worldview Scale (Pre-Service Science Teachers)

Değerli Öğretmen Adayı,

Bu araştırma kapsamında sizlerin insan ve doğa etkileşimine yönelik düşüncelerinizi almak amaçlanmıştır. Elde edilen bulgular araştırma kapsamı dışında başka bir amaç için kullanılmayacaktır. Araştırmadaki elde edilen sonuçların geçerliliği, sizin bu ankete içten ve gerçek yanıtlar vermenize bağlıdır. Bu nedenle, lütfen soruları dikkatle okuyunuz ve sizin görüşlerinizi en iyi yansıtan seçeneği işaretleyiniz. İlgi ve yardımlarınız için şimdiden çok teşekkür ederiz.

Kişisel Bilgiler

1. Cinsiyetiniz: Kadın Erkek
2. Doğum yılınız:
3. Şu anda eğitim aldığınız üniversite:.....
4. Sınıfınız: 1 2 3 4 5 ve sonrası
5. Not ortalamanız:
6. Ailenizin aylık geliri (TL):
 1000 ve daha az 1001-2000 2001-3000
 3001-4000 4001-5000 5001 ve üstü
7. Annenizin mesleği: (emekli ise önceki işini yazınız)
 ev hanımı memur işçi serbest meslek Diğer (lütfen belirtiniz)
8. Babanızın mesleği:
 çiftçi memur işçi serbest meslek çalışmıyor Diğer (lütfen belirtiniz).....
9. Annenizin Eğitim Durumu:
 Okuryazar değil İlkokul Ortaokul Lise
 Üniversite Yüksek Lisans Doktora
10. Babanızın Eğitim Durumu:
 Okuryazar değil İlkokul Ortaokul Lise
 Üniversite Yüksek Lisans Doktora
11. Ailenizle beraber oturduğunuz yerleşim yeri
 Şehir Merkezi İlçe Kasaba Köy
12. Ailenizin evinde siz dahil kaç kişi yaşıyor?
 1 2 3 4 5 6 ve daha fazla
13. Evinizde kaç tane kitap bulunuyor? (Magazin dergileri, gazete ve okul kitapları dışında)
 Hiç yok ya da çok az (0-10) 11-25 tane 26-100 tane 101-200 tane 200'den fazla
14. Yaşadığınız yerde kendinize ait bir çalışma odanız var mı?
 Evet Hayır
15. Yaşadığınız yerde bilgisayarınız var mı?
 Evet Hayır
16. Çevre sorunları ile ne kadar ilgilisiniz?
 Çok fazla Biraz Çok az Hiç
17. Çevre konuları ve problemleri ile ilgili, genel olarak, ne kadar bilginiz olduğunu düşünüyorsunuz?
 Çok Yeteri kadar Biraz Fikrim yok Bilmiyorum
18. Aşağıdakilerden hangisi sizin görüşünüze en yakındır?
 Çevre problemleri, günümüzde insanların karşı karşıya olduğu en önemli 2 ya da 3 problemden biridir.
 Çevre problemleri önemlidir, ama daha başka önemli problemler de vardır.
 Çevre problemleri önemli değildir.
 Çevre problemlerini problem olarak görmüyorum.
19. Türkiye'deki çevre problemleri abartılıyor.
 Kesinlikle Katılmıyorum Katılmıyorum Kararsızım Katılıyorum Kesinlikle Katılıyorum
- 20.

Çevre ile ilgili bilgileri <u>en çok</u> nereden ediniyorsunuz?	Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
Gazete ve dergilerden	5	4	3	2	1
İnternet sitelerini ziyaret ederek	5	4	3	2	1
Televizyon/radyo programlarını izleyerek	5	4	3	2	1
Çevre ile ilgili yürütülen gönüllü çalışmalara katılarak	5	4	3	2	1
Okuldan (öğretmen, dersler, ders kitapları)	5	4	3	2	1
Ailemden	5	4	3	2	1
Arkadaşımdan	5	4	3	2	1
Diğer (Belirtiniz)					

Aşağıda yer alan ifadelere ne derece katılıyorsunuz?		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
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3	İnsan zekâsı ve yetenekleri Dünyanın bozulmayacağına garantisidir.	5	4	3	2	1
4	İnsanlar doğaya çok kötü davranıyor.	5	4	3	2	1
5	Dünyada herkese yetecek miktarda doğal kaynak vardır, yeter ki bu kaynaklardan nasıl yararlanacağımızı bilelim.	5	4	3	2	1
6	Bitki ve hayvanlar da, insanlar kadar yaşama hakkına sahiptir.	5	4	3	2	1
7	Doğanın dengesi, modern endüstri toplumlarının etkileri ile rekabet edebilecek güçtedir.	5	4	3	2	1
8	Bizi diğer canlılardan üstün kılan özel yeteneklerimize rağmen, hala doğa yasaları ile mücadele ediyoruz.	5	4	3	2	1
9	İnsanlığın karşı karşıya kaldığı "ekolojik kriz" olarak adlandırılan olaylar çok abartılıyor.	5	4	3	2	1
10	Dünya, sınırlı alan ve kaynaklara sahip olan bir uzay gemisine benzer.	5	4	3	2	1
11	İnsan olmak doğanın geri kalan bölümüne hükmetmek demektir.	5	4	3	2	1
12	Doğanın dengesi çok hassastır ve kolayca bozulabilir.	5	4	3	2	1
13	İnsanlar, doğayı kontrol edebilmek için doğayı anlamak gerektiğini eninde sonunda öğrenecekler.	5	4	3	2	1
14	Eğer her şey bugünkü gibi devam ederse, yakında büyük bir ekolojik felaket ile karşı karşıya kalacağız.	5	4	3	2	1
15	Dünyanın, insan yaşamını destekleme kapasitesini doldurmak üzereyiz.	5	4	3	2	1
Aşağıdaki unsurların, KENDİ HAYATINIZI YÖNLENDİRİRKEN sizin için ne kadar önemli olduğunu verilen ölçüte göre [Hiç önemli değil (1) – Son derece önemli (5)] lütfen belirtiniz. (Temel Değerler)		Son Derece Önemli	Önemli	Kararsızım	Önemli Değil	Hiç Önemli Değil
1	Otorite sahibi olmak (liderlik yapma hakkı)	5	4	3	2	1
2	Başkalarına hükmetmek/ onları kontrol etmek (Sosyal güç)	5	4	3	2	1
3	Mal mülk ve para sahibi olmak (Zenginlik)	5	4	3	2	1
4	İkna edici olmak / (insanlar ve olaylar üzerinde etkili olmak)	5	4	3	2	1
5	Haksızlıkları düzeltmek, güçsüzlere yardım etmek (Sosyal adalet)	5	4	3	2	1
6	Yardımseverlik (Başkalarının refahı için çabalamak)	5	4	3	2	1
7	Barış içinde bir Dünya (savaşız ve çatışmasız bir Dünya)	5	4	3	2	1
8	Herkes için eşit fırsatlar sağlamak (Eşitlik)	5	4	3	2	1
9	Doğa ile bütün olmak (doğaya uyum sağlamak)	5	4	3	2	1
10	Yeryüzüne saygı duymak (diğer türlerle uyum)	5	4	3	2	1
11	Çevreyi korumak (doğayı gözetmek)	5	4	3	2	1
12	Çevre kirliliğinin önlenmesi	5	4	3	2	1
Aşağıda yer alan ifadelere ne derece katılıyorsunuz? (Kişisel Normlar)		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
1	Başkalarının davranışlarına bakmaksızın, doğayı korumakla yükümlü olduğumu hissediyorum	5	4	3	2	1
2	Çevre kirliliğini durdurmak adına harekete geçmek için istekliyim.	5	4	3	2	1
3	Çevreye zarar vermek benim açımdan yanlıştır .	5	4	3	2	1
4	Doğal yaşama zarar verirsem kendimi suçlu hissederim.	5	4	3	2	1
5	Doğayı korumak benim kişisel sorumluluğumdur.	5	4	3	2	1
6	Doğayı korumak için herkes sorumluluk almalıdır.	5	4	3	2	1
7	Kendimi doğaya, diğer canlılara karşı yükümlü hissettiğim için doğaya zarar vermekten kaçınıyorum .	5	4	3	2	1
8	İklim değişikliğini önlemek için elimden gelen her şeyi yapmak benim kişisel sorumluluğumdur.	5	4	3	2	1
9	Yaşam tarzımı değiştirmek zorunda olmadığım sürece çevreyi korumak için elimden gelenin en iyisini yaparım.	5	4	3	2	1
Aşağıda yer alan ifadelere ne derece katılıyorsunuz? (Öz-Kimlik)		Kesinlikle Katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle Katılmıyorum
1	Kendimi doğa dostu biri olarak görüyorum.	5	4	3	2	1
2	Çevre korumacı davranış sergilemek, kim olduğumun önemli bir parçasıdır.	5	4	3	2	1
3	Çevre dostu davranışlar sergileyen biriyim.	5	4	3	2	1
4	Kendimi çevre problemleri ile ilgili biri olarak görüyorum.	5	4	3	2	1
5	Kendimi çevre dostu bir tüketici olarak görüyorum	5	4	3	2	1

J: Ecological Worldview Scale (Middle School Students)

Değerli Öğrenci,

Bu araştırma kapsamında sizlerin insan ve doğa etkileşimine yönelik düşüncelerinizi almak amaçlanmıştır. Elde edilen bulgular araştırma kapsamı dışında başka bir amaç için kullanılmayacaktır. Araştırmadaki elde edilen sonuçların geçerliliği, sizin bu ankete içten ve gerçek yanıtlar vermenize bağlıdır. Bu nedenle, lütfen soruları dikkatle okuyunuz ve sizin görüşlerinizi en iyi yansıtan seçeneği işaretleyiniz. İlgi ve yardımlarınız için şimdiden çok teşekkür ederiz.

Kişisel Bilgiler

1. Cinsiyetiniz: Kız Erkek
2. Doğum yılınız: 20--.....
3. Sınıfınız: 5 6 7 8
4. Geçen yılki Fen Bilimleri dersi not ortalamanız : _____
5. Şu anda yaşadığınız şehir.....
6. Okulunuzun adı:
7. Sınıfınızdaki öğrenci sayısı:.....
8. Ailenizin aylık geliri (TL):
 1000 ve daha az 1001-2000 2001-3000 3001-4000 4001-5000
 5001 ve üstü
9. Annenizin mesleği: (emekli ise önceki işini yazınız)
 ev hanımı memur işçi serbest meslek Diğer (lütfen belirtiniz)
10. Babanızın mesleği:
 çiftçi memur işçi serbest meslek çalışmıyor Diğer (lütfen belirtiniz).....
11. Annenizin Eğitim Durumu:
 Okuryazar değil İlkokul Ortaokul Lise
 Üniversite Yüksek Lisans Doktora
12. Babanızın Eğitim Durumu:
 Okuryazar değil İlkokul Ortaokul Lise
 Üniversite Yüksek Lisans Doktora
13. Ailenizle beraber oturduğunuz yerleşim yeri
 Şehir Merkezi İlçe Kasaba Köy
14. Ailenizin evinde siz dâhil kaç kişi yaşıyor?
 1 2 3 4 5 6 ve daha fazla
15. Evinizde kaç tane kitap bulunuyor? (Magazin dergileri, gazete ve okul kitapları dışında)
 Hiç yok ya da çok az (0-10) 11-25 tane 26-100 tane 101-200 tane 200'den fazla
16. Evinizde kendinize ait bir çalışma odanız var mı?
 Evet Hayır
17. Evinizde bilgisayarınız var mı?
 Evet Hayır
18. Çevre sorunları ile ne kadar ilgilisiniz?
 Çok fazla Biraz Çok az Hiç
19. Çevre konuları ve problemleri ile ilgili, genel olarak, ne kadar **bilginiz** olduğunu düşünüyorsunuz?
 Çok Yeteri kadar Biraz Fikrim yok Bilmiyorum
20. Aşağıdakilerden hangisi sizin görüşünüze en yakındır?
 Çevre problemleri, günümüzde insanların karşı karşıya olduğu en önemli 2 ya da 3 problemden biridir.
 Çevre problemleri önemlidir, ama daha başka önemli problemler de vardır.
 Çevre problemleri önemli değildir.
 Çevre problemlerini problem olarak görmüyorum.
21. Türkiye'deki çevre problemleri abartılıyor.
 Kesinlikle Katılmıyorum Katılmıyorum Kararsızım Katılıyorum Kesinlikle Katılıyorum
- 22.

Çevre ile ilgili bilgileri en çok nereden ediniyorsunuz?	Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
Gazete ve dergilerden	5	4	3	2	1
İnternet sitelerini ziyaret ederek	5	4	3	2	1
Televizyon/radyo programlarını izleyerek	5	4	3	2	1
Çevre ile ilgili yürütülen gönüllü çalışmalara katılarak	5	4	3	2	1
Ders kitaplarından	5	4	3	2	1
Arkadaşlarımdan	5	4	3	2	1
Diğer (Belirtiniz)					

Aşağıda yer alan ifadelere ne derece katılıyorsunuz?		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
1	İnsanlar ihtiyaçlarını karşılamak için doğayı değiştirme hakkına sahiptirler.	5	4	3	2	1
2	İnsanların doğaya müdahalesi genellikle felaketle sonuçlanır.	5	4	3	2	1
3	İnsan zekâsı ve yetenekleri Dünyanın bozulmayacağına garantisidir.	5	4	3	2	1
4	İnsanlar doğaya çok kötü davranıyor.	5	4	3	2	1
5	Dünyada herkese yetecek miktarda doğal kaynak vardır, yeter ki bu kaynaklardan nasıl yararlanacağımızı bilelim.	5	4	3	2	1
6	Bitki ve hayvanlar da, insanlar kadar yaşama hakkına sahiptir.	5	4	3	2	1
7	Doğanın dengesi, modern endüstri toplumlarının etkileri ile rekabet edebilecek güçtedir.	5	4	3	2	1
8	Bizi diğer canlılardan üstün kılan özel yeteneklerimize rağmen, hala doğa yasaları ile mücadele ediyoruz.	5	4	3	2	1
9	İnsanlığın karşı karşıya kaldığı "ekolojik kriz" olarak adlandırılan olaylar çok abartılıyor.	5	4	3	2	1
10	Dünya, sınırlı alan ve kaynaklara sahip olan bir uzay gemisine benzer.	5	4	3	2	1
11	İnsan olmak doğanın geri kalan bölümüne hükmetmek demektir.	5	4	3	2	1
12	Doğanın dengesi çok hassastır ve kolayca bozulabilir.	5	4	3	2	1
13	İnsanlar, doğayı kontrol edebilmek için doğayı anlamak gerektiğini eninde sonunda öğrenecekler.	5	4	3	2	1
14	Eğer her şey bugünkü gibi devam ederse, yakında büyük bir ekolojik felaket ile karşı karşıya kalacağız.	5	4	3	2	1
15	Dünyanın, insan yaşamını destekleme kapasitesini doldurmak üzereyiz.	5	4	3	2	1
Aşağıdaki unsurların, KENDİ HAYATINIZI YÖNLENDİRİRKEN sizin için ne kadar önemli olduğunu verilen ölçüte göre [Hiç önemli değil (1) – Son derece önemli (5)] lütfen belirtiniz. (Temel Değerler)		Son Derece Önemli	Önemli	Kararsızım	Önemli Değil	Hiç Önemli Değil
1	Otorite sahibi olmak (liderlik yapma hakkı)	5	4	3	2	1
2	Başkalarına hükmetmek/ onları kontrol etmek (Sosyal güç)	5	4	3	2	1
3	Mal mülk ve para sahibi olmak (Zenginlik)	5	4	3	2	1
4	İkna edici olmak / (insanlar ve olaylar üzerinde etkili olmak)	5	4	3	2	1
5	Haksızlıkları düzeltmek, güçsüzlere yardım etmek (Sosyal adalet)	5	4	3	2	1
6	Yardımseverlik (Başkalarının refahı için çabalamak)	5	4	3	2	1
7	Barış içinde bir Dünya (savaştan kaçınarak)	5	4	3	2	1
8	Herkes için eşit fırsatlar sağlamak (Eşitlik)	5	4	3	2	1
9	Doğa ile bütün olmak (doğaya uyum sağlamak)	5	4	3	2	1
10	Yeryüzüne saygı duymak (diğer türlerle uyum)	5	4	3	2	1
11	Çevreyi korumak (doğayı gözetmek)	5	4	3	2	1
12	Çevre kirliliğinin önlenmesi	5	4	3	2	1
Aşağıda yer alan ifadelere ne derece katılıyorsunuz? (Kişisel Normlar)		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
1	Başkalarının davranışlarına bakmaksızın, doğayı korumakla yükümlü olduğumu hissediyorum	5	4	3	2	1
2	Çevre kirliliğini durdurmak adına harekete geçmek için istekliyim.	5	4	3	2	1
3	Çevreye zarar vermek benim açımdan yanlıştır .	5	4	3	2	1
4	Doğal yaşama zarar verirsem kendimi suçlu hissederim.	5	4	3	2	1
5	Doğayı korumak benim kişisel sorumluluğumdur.	5	4	3	2	1
6	Doğayı korumak için herkes sorumluluk almalıdır.	5	4	3	2	1
7	Kendimi doğaya, diğer canlılara karşı yükümlü hissettiğim için doğaya zarar vermekten kaçınıyorum .	5	4	3	2	1
8	İklim değişikliğini önlemek için elimden gelen her şeyi yapmak benim kişisel sorumluluğumdur.	5	4	3	2	1
9	Yaşam tarzımı değiştirmek zorunda olmadığım sürece çevreyi korumak için elimden gelenin en iyisini yaparım.	5	4	3	2	1
Aşağıda yer alan ifadelere ne derece katılıyorsunuz? (Öz-Kimlik)		Kesinlikle Katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle Katılmıyorum
1	Kendimi doğa dostu biri olarak görüyorum.	5	4	3	2	1
2	Çevre korumacı davranış sergilemek, kim olduğumun önemli bir parçasıdır.	5	4	3	2	1
3	Çevre dostu davranışlar sergileyen biriyim.	5	4	3	2	1
4	Kendimi çevre problemleri ile ilgili biri olarak görüyorum.	5	4	3	2	1
5	Kendimi çevre dostu bir tüketici olarak görüyorum	5	4	3	2	1

K: Curriculum Vitae

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BS	Erzincan University, Science Education	2011
High School	Niğde Anadolu Lisesi, Niğde	2007

WORK EXPERIENCE

Year	Place	Enrollment
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FOREIGN LANGUAGES

Advanced English

PUBLICATIONS

MANUSCRIPTS

Ateş, H. & Durmaz, S. (2017). Turkish adaptation of nature of technology scale, *Journal of Education and Vocational Research*, 8(1), 17-22

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Ates, H. & Oztekin, C. (2018). *Ortaokul Öğrencilerin İnsan-Doğa İlişkisine Yönelik Algılarının Çizim Vasıtasıyla Belirlenmesi*, 12. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi, 04-06 Ekim 2018, Denizli, Türkiye

Ates, H., Oztekin, C. & Teksoz, G., (2018). *Ortaokul Öğrencileri, Fen Bilimleri Öğretmen Adayları Ve Fen Bilimleri Öğretmenleri Örneğinde Yeni Ekolojik Paradigma Ölçeğinin Geçerlik ve Güvenirlik Çalışması*, 6. Ulusal Kimya Eğitimi Kongresi, 02-04 Mayıs 2019, Ankara, Türkiye

Teksoz, G., Oztekin, C., Ates, H. (2016). *An Attempt for Developing Determinants of Low Carbon Behavior: A Clue for Climate Change Adaptation and Mitigation*, 14th International JTEFS/BBCC Conference Sustainable Development, Culture, Education, 12 May-14 May 2016, Konya, Turkey

L: Turkish Summary/Türkçe Özet

1.Giriş

İnsanlığın tarihsel gelişimi onu aynı zamanda doğadan da uzaklaştırmıştır (Brito ve Smith, 2012). Yüzyıllar boyunca, doğa, dünya ve diğer tüm canlılarla etkileşim içinde olan insanlar, zaman içerisinde, geçen her yüzyılda onlardan uzak durmuş, kişinin kendi özünün/özelliğinin farkında olması sürecini tecrübe etmiş ve diğer canlılara duydukları saygıyı yitirmeye başlamıştır (Schultz, 2011). Teknolojik gelişmeler, kentleşme ve nüfus artışı gibi faktörler insanlar ve doğa arasındaki etkileşimi azaltmış, bununla beraber sanayileşme doğadaki yaşam koşullarını olumsuz yönde etkilemiştir (Colucci-Gray, Perazzone, Dodman ve Camino, 2013; Feldman ve Nation, 2015) . Sanayi devrimi ile başlayan süreç, bilimi geliştirmesine rağmen, insanı mevcut biyolojik koşullardan ve ekolojik çevreden soyutlamıştır (Gough, 2017). 19. yüzyılda insanlar hızlı bir teknolojik değişim sürecine girmiş, bu sırada çevreye ve doğal hayata zarar vermiş ve önlem almaya başlamışlardır (Choi, Lee, Shin, Kim ve Krajcik, 2011). İnsanoğlu, dünyanın doğal kaynaklarını aşırı kullanarak hem bugünün hem de gelecek nesiller üzerinde etkili olan çevresel bir krize neden olmaktadır (Cairns, 2002). Dünyanın her yerindeki insanlar bu durumdan etkilendiklerinden, bugün yaşadığımız çevrenin yaşadığımız gezegen ile tamamen sınırlıdır (Nickerson, 2003). Yeryüzü oldukça geniş olmasına rağmen, bugün her yanı kullanılmaktadır. Son araştırmalar, dünyamızın biyolojik kapasitesinin, 70'li yılların başından beri ihtiyaçlarımızın talebini karşılayamadığını göstermiştir (Living Planet Report, 2014). Bu talebin karşılanamaması, birkaç on yıl önce su ve hava kirliliği olarak görülen çevre sorunlarına yol açmaktayken bugün toksik atıklar, endüstriyel tarım, yanan fosil yakıtlar, orman sayısındaki hızlı düşüş, çölleşme, ozon tabakasının tükenmesi, doğadaki biyolojik çeşitliliğin tahribi, deniz ve okyanusların kirlenmesi, sera gazı emisyonları ve iklim değişikliği gibi çok çeşitli alanlarda çevre sorunları yayılmış durumdadır (Dunlap, Liere, Mertig ve Jones., 2000; Environmental Protection Agency [EPA], 2016; Feldman ve Nation, 2015; Steg, ve Vlek, 2009; Winter, ve Koger, 2004). Ayrıca, bu tür çevresel

sorunların nedenleri karmaşık ve birbirine bağlı durumdadır ve bu sorunların çözümü ise zor ve karmaşıktır (Stern, Young ve Druckman, 1992). Son yıllarda çevrenin kötüleşmesi tüm toplumlar için önde gelen bir endişe haline gelmiştir (Diekmann ve Franzen, 2019) ve çevre sorunlarına olan ilgi hem ulusal hem de uluslararası düzeyde artmıştır (Dunlap, vd., 2000). Halkın çevresel sorunları nasıl gördüğünü anlamakla ilgilenen araştırmacılar, ortaya çıkan bu görüş unsurlarına yavaş yavaş dikkat etmeye başlamışlardır (Stern, Dietz, Kalof ve Guagnano, 1995) ve zamanla çevre konularına ilişkin toplumun bakış açılarının olduğu çalışmaların sayıları da yavaş yavaş artmıştır (Dunlap, 1998; O'Connor, Bord ve Fisher, 1999). Özellikle, bireysel tutum ve inançların çevresel kararları nasıl etkilediğiyle ilgilenen araştırmacılar ve politika yapıcılar arasında çevresel kaygılara verilen önem artmıştır (Amburgey ve Thoman, 2012). Farklı alanlardan araştırmacılar, bu kaygıların bireysel inanç sistemlerinde nasıl yapılandırıldığı da dahil olmak üzere çevresel kaygının kavramsal temellerine büyük önem vermişlerdir (Xiao ve Dunlap, 2007). Çevresel kaygı ve Yeni Ekolojik Paradigma (NEP) adlı onun ölçüm aracı, çevre psikolojisindeki temel yapılar arasında yer almakta ve bu alandaki birçok çalışmada tartışılmaktadır (Hawcroft ve Milfont, 2010; Kaiser, Wölfing ve Fuhrer, 1999).

1.1. Çevresel Kaygılar ve Yeni Ekolojik Paradigma

Ekolojik dünya görüşü olarak da adlandırılan çevresel kaygıyı anlamak önemlidir (Amburgey ve Thoman, 2012). Ekolojik dünya görüşü ve sonuçlarını, insanlık-doğa ilişkileri hakkındaki fikirleri ve insanların çevre hakkında ne düşündüklerini ve bahsettiğini anlama çabaları araştırmacılar arasında popüler bir araştırma konusu haline gelmiştir (Bonnes ve Bonaiuto, 2002; Dunlap ve Emmet-Jones, 2003). Ekolojik dünya görüşleri, doğal hayatın değeri ve onunla olan ilişkisi ile ilgili insanların inançlarıdır ve insanların doğa ve insanlığa tehlikeye neden olduğunu nasıl değerlendirdiğini ve tepki verdiğini etkiler (Castro 2006; Dunlap ve Van Liere 1978; Dunlap ve diğerleri. 2000). Bu durum göz önüne alındığında, araştırmacıların, insanların neden çevreye bu kadar müdahalede bulduklarını araştırması kritik öneme sahiptir ve bu hedefe ulaşmak için önemli bir adım, insanların çevresel dünya görüşlerini geçerli ve güvenilir bir şekilde ölçmektir

(Hawcroft ve Milfont, 2010). Ekolojik dünya görüşünü ölçmek için, birçok ölçme aracı olmasına rağmen, araştırmacılar çoğunlukla Dunlap ve diğerleri (2000) tarafından geliştirilen NEP ölçeğini kullanmaktadır. NEP ekolojik yanlı bir dünya görüşünün onaylanmasının bir ölçüsüdür ve çevre eğitimi, açık hava etkinlikleri ve davranış veya tutumlardaki farklılıkların altta yatan değerler, dünya görüşü veya paradigma ile açıklandığına inanılan diğer alanlarda yaygın olarak kullanılır (Anderson, 2012). NEP'e göre, toplum çevre bakış açısını değiştirme sürecine katılmaktadır (Corral-Verdugo ve Armendariz, 2000). Niyet, tutum, inanç ve davranış gibi çevresel kaygılar, doğal kaynaklar ve kirlilik gibi çeşitli çevresel konularla ilgili çevresel kaygılar ve insan-çevre ilişkisine ilişkin genel inançların ölçülmesi gibi çeşitli ifadeleri içerir (Hawcroft ve Milfont, 2010).

1.2.Temel Değerler

Çevresel psikolojide, bir insanın veya başka bir sosyal varlığın yaşamında yol gösterici bir ilke görevi gören, arzu edilen ve geçici bir hedef olarak tanımlanabilecek değerler kavramı (Schwartz, 1992) çeşitli araştırmalarla kullanılmaktadır. Çevresel çalışmalardaki değerlere karşılık gelen birçok çalışma, sınıflandırılmış 56 temel değeri içeren Değer Teorisine dayanmaktadır (de Groot ve Steg, 2007; Stern, ve diğerleri 1999; Stern, 2000). Çevresel çalışmalardaki değerlere karşılık gelen birçok çalışma, sınıflandırılmış Schwartz (1992) tarafından geliştirilen temel değerlerin yer aldığı Değer Teorisine dayanmaktadır. Fakat zamanla araştırmacılar çalışmalarında 56 değerın sayısını azaltmışlardır. Örneğin, Stern ve diğerleri tarafından hazırlanan bir dizi çalışmada (Stern, 2000; Stern ve Dietz, 1994; Stern, Dietz ve Kalof, 1993) üç farklı temel değer faktörleri üzerine yoğunlaşmıştır: Egoist, sosyal-özgecil ve biyosferik değer. Bu çalışmada, temel değerlerin önemli olduğu düşünülmektedir, çünkü bunlar çeşitli çevresel inanç, tutum ve normları etkileyebilirler (Rohan, 2000). Bu temel değerleri ayrıntılı olarak ele aldığımızda, doğayı anlamak için uygun olabilecek her değerın bireyin belirli sonuçlara duyarlı olmasını sağladığı varsayılmaktadır (de Groot ve Steg, 2007). Temel değerler arasında, egoistik değere sahip bireyler, doğal kaynakları kullanma açısından kendi çıkarlarına ve isteklerine önem verirler. Bununla birlikte, sosyal-özgecil değeri olan insanlar, diğer insanların refahına vurgu yapar. Biyosferik değer

insan olmayan türlere veya biyosfere odaklanır ve bu tür bireyler bitkiler ve hayvanlar dahil tüm canlılara yapılacak insan müdahalesinden endişe duyarlar (Schultz ve diğerleri, 2005) ve çevresel tercihlerle güçlü ve tutarlı bir şekilde ilişkilidirler (Steg ve De Groot, 2012). Değerlerin özellikleri de bu çalışmada değerlerle çalışmanın neden önemli olduğunu göstermektedir. Sebeplerden biri, teorik ve deneysel olarak doğrulanmış olmasının, değerlerin ekolojik dünya görüşü, kişisel norm ve öz kimlik gibi bazı psikolojik değişkenlerle ilişkilendirilmesinde önemli bir rol oynadığıdır (örneğin, Bardi ve Schwartz, 2003; Groot ve Steg, 2008; Nordlund ve Garvill, 2003; Stern ve diğerleri, 1995; Stern ve diğerleri, 1998; Stern ve diğerleri, 1999; Stern, 2000). Örneğin, Stern'e (2000) göre, değerler ekolojik dünya görüşlerine öncülük etmektedir. Ek olarak, çeşitli değer türlerini anlamak, insan inancını şekillendirmeye yardımcı olur (Dietz Fitzgerald ve Shwom, 2005). Bu açıklamada, insanın çevreye olan inancını etkilemek için değerlerin elde edildiği anlaşılabilir (Snelgar, 2006). Bu nedenle, değerler çevreye olan genel inancı etkileyebilecek etkili bir faktör olarak düşünülmektedir (Stern vd., 1999).

1.3. Ahlaki Normlar

Kişisel normlar, Schwartz (1977) tarafından, toplum yanlısı davranışların kişisel normlardan uyması beklenen toplum yanlısı davranışları hesaba katması önerilen norm-aktivasyon modelinde içselleştirilmiş değerlere dayanan insanların kendi beklentileri olarak tanımlanmaktadır ve belirli eylemlerde bulunma veya bunlardan kaçınma konusunda ahlaki zorunluluk duygularını yansıtmaya durumunu ifade eder (Schwartz ve Howard, 1981). Kişisel normlar ilk olarak Norm aktivasyon modelinde özgecil davranışı açıklamak için geliştirilmiştir ve bu modelin çekirdeğini oluşturmuştur (Schwartz, 1977). Kişisel normlar, çevresel durumların mevcut olduğuna inandıkları inançlar tarafından harekete geçirilmekte, insanların değer verdiği şeyleri ve insanların bu tehdidi azaltmak için hareket edebileceği inancı oluşturmaktadır (Schwartz 1977). Ek olarak, kişisel norm, insan-doğa ilişkisinin açıklanmasındaki rolünü daha iyi anlamak için farklı bakış açılarından incelenmiştir. Örneğin, çevrenin durumuna ilişkin insan inanç sistemi kişisel normları etkilemek için elde edilir (Clark, Kotchen, ve Moore, 2003; Schwartz, 1973; Steg ve de Groot, 2010; Stern Dietz, Abel, ve Guagnano, 1995; Wynveen,

Kyle, ve Tarrant, 2012). Stern ve diğ. (1999) ve Stern (2000) kişisel normların NEP'den etkilendiğini belirtmiştir. NEP, genel olarak bireylerin çevre ile ilgili zihinsel durumdaki inançlarını yansıttığından, NEP'in bireylerin çevre yanlısı kişisel normlarını etkileyebileceği varsayılmaktadır (Stern ve diğerleri, 1999). Araştırmacıların çoğu, NEP'nin insanların genel ekolojik dünya görüşü inançlarına odaklanmasından dolayı kişisel normların şekillenmesinde de önemli bir rol oynadığını belirtmiştir (Steg ve De Groot, 2010; Stern ve diğerleri, 2005). Schwartz (1977), kişisel normların değerlerden kaynaklandığını ve içsel değerlere bağımlılığı yansıttığını, yani insanların ahlaki açıdan ortak değerlerine göre hareket etmek zorunda olduklarını düşündüklerini öne sürmüşlerdir. Stern ve diğ. (1999) ve Stern (2000) kişisel normların biyosferik değerler, özgecil değerler ve egoistik değerler dahil temel değerlerden etkilendiğini belirtmişlerdir.

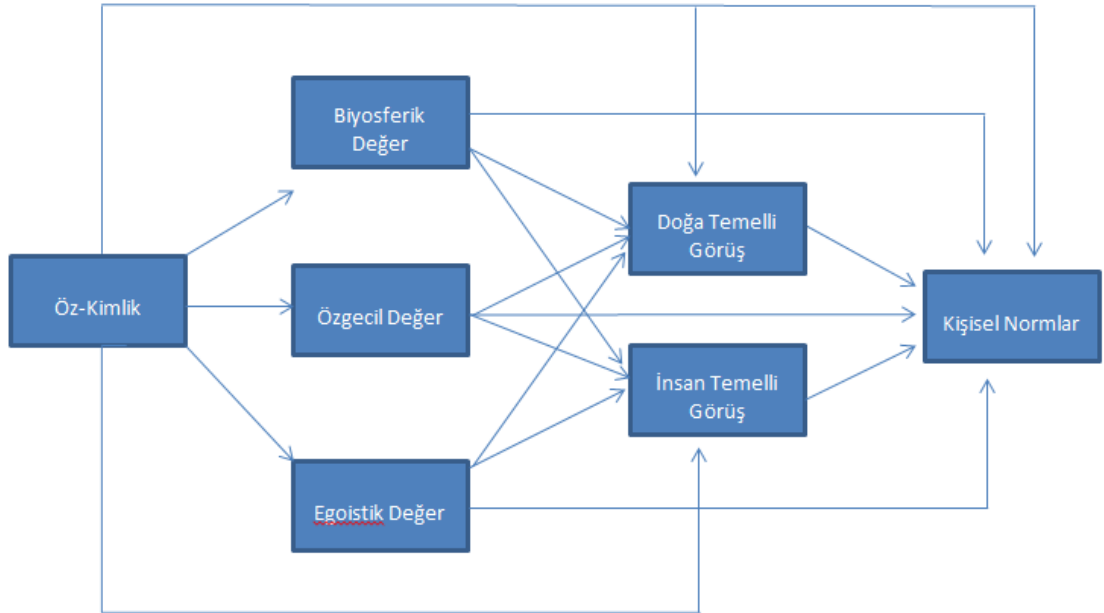
1.4. Öz-Kimlik

Bir tanımda, Sherwood (1965) öz kimliği kişinin kendini algılaması olarak tanımlarken, bir başka tanımda ise öz kimlik, bir bireyin kendini nasıl gördüğünü ve fiziksel özellikler, tercihler, değerler, kişisel hedefler, alışkanlık davranışı, kişilik özellikleri ve kişisel anlatımlar gibi tüm yönlerini kapsadığını ifade edilmiştir (McAdams, 1995). Öz-kimlik, kişilerin kendilerini, belirli bir sosyal rol için ölçütleri ne ölçüde karşıladığını, ne ölçüde gördüğünü yansıtır (Conner ve Armitage, 1998). Ayrıca, insanlar kendilerini öz kimlikleriyle uyumlu şekillerde sunma eğilimindedir (Burke ve Reitzes, 1991). Örneğin, öz-kimlik, kendisini diğerlerinden ayırmanın yanı sıra, ait olduğu sosyal grupların değerlerini ve inançlarını takip etmeyi de sağlar (Christensen, Rothberger, Wood ve Matz, 2004). Crompton ve Kasser (2009), değerlerin ve yaşam hedeflerinin, arzu edilen, önemli ve yaşamlarına layık olduklarını düşündüklerini yansıtan insanların kimlikleri konusundaki bakış açıları olduğunu belirtmiştir. Verplanken ve Holland'a (2002) göre değerler, bir kişinin öz kavramının önemli bileşenlerini oluşturabilir ve bu nedenle bir kişinin kimliğine katkıda bulunabilir. Ek olarak, Sparks ve Shepherd (1992), bir kişinin öz kimliğinin o kişinin inançlarına ve değerlerine yansıdığını belirtmiştir. İlgili literatür incelendiğinde, öz kimlik kavramı ile değerler ve ekolojik dünya görüşleri gibi psikolojik değişkenler arasındaki ilişki çevresel psikoloji ile

ilgili teorik ve deneysel çalışmalarda yer almaktadır (örneğin, Fielding ve diğerleri 2008; Hitlin, 2003; Gatersleben, Murtagh ve Abrahamse, 2014; Snelgar, 2003; Steg ve De Groot, 2012; Walton ve Jones, 2018; Van der Werff, Steg ve Keizer, 2014).

1.5. Tasarlanan Kavramsal Modele Genel Bakış

Bu çalışma ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlik arasındaki ilişkileri açıklayan kavramsal bir model sunmaktadır. Şekil 1’de önceki çalışmaların sonuçlarından toplanan teorik ve deneysel kanıtlara dayanarak, bu yapılar arasındaki varsayılan ilişkileri gösteren yapısal bir model verilmiştir (de Groot ve Steg, 2007; Schwartz 1977; Schwartz, 1994; Sherwood, 1965; Stern, 2000; Stern ve diğerleri 1999; Stryker, 1968). Modele göre, bireyin öz kimliğinin, biyosferik, özgecil ve egoistik değerler, doğaya dayalı ve insan temelli görüş ve kişisel normlara katkıda bulunacağı öne sürmektedir. Değerler ve NEP’in kişisel normları üzerinde de doğrudan etkisi vardır. Dahası, öz-kimlik NEP ve değerler yoluyla kişisel normlara katkıda bulunmaktadır. Ek olarak, temel değerler NEP aracılığıyla kişisel normlara katkıda bulunmaktadır.



Şekil 1. Ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlik arasındaki ilişkileri açıklayan kavramsal model

1.6. Amaç ve Araştırma Problemleri

Bu çalışmada amaç ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşlerini, temel değerleri, kişisel normları ve öz kimliklerini belirlemektir. Ek olarak, ekolojik dünya görüşleri, temel değerler ve öz kimliğin kişisel normlar üzerinde ne düzeyde etkisinin olduğunu belirlemek için kavramsal bir ilişki modeli çizmek de amaçlar arasında yer almaktadır. Bu çalışma kapsamında üç araştırma problemi vardır.

1. Ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşleri, temel değerleri ve öz kimliklerinin kişisel normları üzerinde ne düzeyde bir etkisi vardır?
2. Ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşü inançları, temel değerleri, kişisel normları ve öz kimlikleri ne düzeydedir?
3. Ekolojik dünya görüşü inancı, temel değerleri, kişisel normlar ve öz kimlik ölçeklerinin Türkçe adaptasyon ve geçerlilik çalışmaları neyi göstermektedir?

2. Yöntem

Araştırma korelasyon araştırma modeline göre yürütülmüş olup araştırmanın verilerinin toplanması sırasında pilot çalışma esnasında 2396 kişiye ulaşılırken asıl çalışmada ise ortaokul öğrencileri ($N=3733$), fen bilimleri öğretmen adayları ($N=720$) ve fen bilimleri öğretmenlerinin ($N=601$) yer aldığı 5078 kişiden veriler toplanmıştır. Araştırmanın verileri dört üniversitede ve Kırşehir, Kayseri, Manisa ve Ankara'nın yer aldığı dört şehirde toplanmıştır. Araştırmanın örneklem belirleme süreci uygunluk örneklemine uygun şekilde yapılmıştır. Örneklemin genel özelliklerin yer aldığı bilgiler Tablo 1' de gösterilmiştir. Araştırmada yer alan 3733 öğrencinin 1838'i kız, 1894'ü ise erkek öğrenciden oluşmaktadır. Öğrenciler içerisinde 401'i 5. sınıfta, 787'si 6. sınıfta, 1153'ü 7. sınıfta ve 1392'si ise 8. sınıfta eğitim almaktadır.

Tablo 1. Örneklemin Genel Özellikleri

Cinsiyet	Ortaokul Öğrencileri		Fen Bilimleri Öğretmen Adayı		Fen Bilimleri Öğretmeni		Toplam	
	f	%	f	%	f	%	f	%
Kadın	1846	49	632	87	377	63	2855	56
Erkek	1907	51	92	13	224	37	2223	44
Toplam	3753	100	724	100	601	100	5078	100

Fen bilimleri öğretmen adayları içerisinde 630'u kadın iken, 90'ı ise erkektir. Sınıflar bazında değerlendirme yapıldığında, öğretmen adayların 113'ü 1. sınıfta, 215'i 2.sınıfta, 187'si 3. sınıfta ve 205'i ise 4. sınıfta eğitim almaktadır. Araştırmaya katılanların Fen bilimleri öğretmenlerinin 377'si kadın iken, 224'ü ise erkektir.

2.1. Veri Toplama Araçları

Nicel araştırma yöntemlerinin bulgularını ortaya çıkarmayı amaçlayan veri toplama araçları beş bölümden oluşmaktadır: Demografik Bilgi Ölçeği (Öğrenci Demografik Bilgi Ölçeği, Fen Bilimleri Öğretmen Demografik Bilgi Ölçeği ve Fen Bilimleri Öğretmen Adayı Demografik Bilgi Ölçeği), Yeni Ekolojik Paradigma Ölçeği, Öz Kimlik Ölçeği, Temel Değerler Ölçeği ve Kişisel Norm Ölçeği.

Çalışmada şu demografik özelliklere yer verilmiştir: Yaş, cinsiyet, aile geliri, aile eğitim düzeyi, yerleşim yeri, deneyim. Likert tipi ölçekler içerisinde ilk olarak Dunlap ve diğerleri (2000) tarafından geliştirilen Yeni Ekolojik Paradigma ölçeği yer almaktadır. Bu ölçek 5'li likert tipinde hazırlanmış ve 'Kesinlikle Katılıyorum' ile 'Kesinlikle Katılmıyorum' arasında değişen 15 maddeden oluşmaktadır. Schwartz (1992) tarafından geliştirilen temel değerler ölçeğinin kısa bir versiyonu, yaşamlarında önem verdikleri değerleri incelemek için kullanılmıştır. Bu ölçeğin kısa versiyonu Stern, Dietz ve Guagno (1998) tarafından geliştirilmiştir. Bu ölçek 5'li likert tipinde hazırlanmış ve 'Son Derece Önemli' ile 'Hiç Önemli Değil'

arasında değişen 12 maddeden oluşmaktadır. Temel Değerler ve bu değerlere ilişkin güvenirlik katsayıları Tablo 2’de gösterilmiştir.

Tablo 2. Temel Değerler ve Bu Değerlere İlişkin Güvenirlik Katsayıları

Değerler	Maddeler	Cronbach Alpha Güvenirlik Katsayısı (α)		
		Öğrenci	Öğretmen Adayı	Öğretmen
Egoistik	Liderlik yapma hakkı	.65	.68	.65
	Sosyal güç			
	Zenginlik			
	İkna edici olmak			
Özgeci	Sosyal adalet	.70	.72	.70
	Yardımsverlik			
	Barış içinde bir Dünya (Eşitlik			
Biyosferik	Doğaya uyum sağlamak	.70	.74	.79
	Diğer türlerle uyum			
	Çevreyi korumak			
	Çevre kirliliğinin önlenmesi			

Kişisel Normlar ölçeği 5’li likert tipinde hazırlanmış ve ‘Kesinlikle Katılıyorum’ ile ‘Kesinlikle Katılmıyorum’ arasında değişen 9 maddeden oluşmaktadır. Bu ölçek Stern ve diğerleri (1999) tarafından geliştirilmiştir. Öz-Kimlik Ölçeği bazı araştırmalarda geliştirilmiştir (Sparks ve Shepherd, 1992; Van der Werff et al., 2013) ve 5’li likert tipinde hazırlanmış ve ‘Kesinlikle Katılıyorum’ ile ‘Kesinlikle Katılmıyorum’ arasında değişen 5 maddeden oluşmaktadır. Bütün ölçeklere ilişkin verilerin yer aldığı bilgiler Tablo 3’de gösterilmiştir.

Tablo 3. Ölçeklerin Özelliklerine İlişkin Bilgiler

Ölçek	Kaynak	Türkçe Adaptasyonu	Madde sayısı	Aralık	Likert Tipi	Cronbach Alpha Güvenirlik Katsayısı (α)		
						Ö	FBÖA	FBÖ
NEP	Dunlap ve diğerleri., 2000	Bu araştırma ile yapılmıştır.	15	1=Kesinlikle Katılmıyorum - , 5= Kesinlikle Katılıyorum	5	.82	.63	.69
Temel Değerler	Stern ve diğerleri., 1998	Sahin, 2013	12	1=Hiç Önemli Değil, 5= Son Derece Önemli	5	.72	.75,	.72

Tablo 3 (Devamı)

Kişisel Normlar	Stern ve diğerleri., 1999	Bu araştırma ile yapılmıştır.	9	1=Kesinlikle Katılmıyorum - , 5= Kesinlikle Katılıyorum	5	.81	.88	.80
Öz- Kimlik	Sparks ve Shepherd, 1992; Van der Werff ve diğerleri., 2013	Bu araştırma ile yapılmıştır.	5	1=Kesinlikle Katılmıyorum - , 5= Kesinlikle Katılıyorum	5	.83	.83	.90

Not: Ö=Öğrenci, FBOS= Fen Bilimleri Öğretmen Adayı, FBÖ= Fen Bilimleri Öğretmeni

2.2. Verilerin Analizi

Araştırmada istatistik analiz yapmak için SPSS 21 ve AMOS 21 programları kullanılmıştır. SPSS 21 ile yapılan veri analizi sırasında, missing verileri bulma, tanımlayıcı analiz yapma, varsayımları test etme ve açıklayıcı faktör analizini kullanarak yapı geçerliliği sağlama gerçekleştirilmiştir. Mod, ortanca, ortalama, frekans ve standart sapma gibi merkezi eğilim ölçütlerini belirlemek için SPSS 21 yardımıyla Tanımlayıcı istatistiklerden faydalanılmıştır. Doğrulayıcı Faktör Analizi (CFA) ve Yol Analizi, AMOS 21 kullanılarak yapılmıştır.

2.3. Geçerlik ve Güvenirlik Analizi

Çalışmada Yeni Ekolojik Paradigma Ölçeği, Temel Değerler Ölçeği, Kişisel Norm Ölçeği ve Öz Kimlik Ölçeği olmak üzere dört ölçek yer almaktadır. Faktör analizi ile bu ölçeklerin yapı geçerliliği sağlanmıştır. Dolayısıyla, bu ölçeklerle açıklayıcı ve doğrulayıcı faktör analizleri yapılmıştır. Bunu gerçekleştirmek için, SPSS 21 ile açıklayıcı faktör analizi ve AMOS 21 ile ise doğrulayıcı faktör analizi yapılmıştır. Açıklayıcı faktör analizlerinin sonuçlarını tahmin etmek için faktör yükleri ve öz-değerler incelenmiştir. Ayrıca, doğrulayıcı faktör analizlerinin sonuçlarını yorumlamak için de model uyum göstergeleri incelenmiştir. Açıklayıcı faktör analizi sonuçlarına göre NEP ölçeği insan merkezli ve doğa merkezli görüşler olmak üzere iki boyuttan oluşmaktadır. Doğrulayıcı faktör analiz sonuçlarına göre, NEP ölçeği iki boyutta iyi bir şekilde bütün örneklem gruplarında fit etmiştir. Sadece iki madde düşük faktör yüklerine sahip olduğu için çalışmadan çıkarılmıştır.

Temel Değerler ölçeği biyosferik, özgeci ve egoistik değerler olmak üzere üç boyuttan oluşmaktadır. Doğrulayıcı faktör analiz sonuçlarına göre, Temel Değerler ölçeği üç boyutta iyi bir şekilde bütün örneklem gruplarında fit etmiştir. Kişisel normlar ve Öz-Kimlik ölçekleri ise tek boyuttan oluşmaktadır.

Çalışmanın Sayıltıları

1. Tüm katılımcılar ölçekleri ciddiyet ve içtenlikle cevaplamışlardır.
2. Ölçeklerin uygulanması tüm katılımcılar için standart bir ortamda gerçekleşmiştir.
3. Veri toplama esnasında öğretmen adayları, öğretmenler ve öğrenciler birbirleriyle etkileşim halinde bulunmamışlardır.

3. Bulgular

Bu bölümde tanımlayıcı istatistikten ve çıkarımsal istatistikler sunulmuştur. Tanımlayıcı istatistikler; ortaokul öğrencilerinin, öğretmen adaylarının ve öğretmenlerin ekolojik dünya görüşlerini, temel değerleri, kişisel normları ve öz kimlikleri içeren tüm değişkenlerin yer aldığı madde ve toplam ortalama puanları, standart sapma değerleri ve sıklık dağılımlarını içerir. Çıkarımsal istatistikte ise yapısal eşitlik modeli, yol analizi varsayımları ve çıkarımsal istatistiklerde model test işlemleri sunulmuştur.

3.1. Tanımlayıcı Analizler

3.1.1. Ekolojik Dünya Görüşleri

İlk araştırma sorusunda ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşü inançlarının incelenmesi amaçlanmaktadır. Bu nedenle, bu bölümde bu amaca yönelik analizler yer almaktadır. Tablo 4'de ortalamalar ve üç örneklem grubuna göre ortalamaları ve standart sapmaları içeren tanımlayıcı istatistikler verilmiştir.

Tablo 4. İnsan merkezli ve doğa merkezli boyutlara yönelik tanımlayıcı istatistik sonuçları

Örneklem Grubu	İnsan Merkezli		Doğa Merkezli	
	M	SS	M	SS
Ortaokul Öğrencileri	3.16	1.33	3.82	1.14
Fen Bilimleri Öğretmen Adayları	3.65	1.12	3.93	.97
Fen Bilimleri Öğretmenleri	3.81	1.23	3.95	1.05
TOPLAM	3.54	1.23	3.91	1.05

Ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşü maddelerine yönelik ortalamaları sırasıyla 3.49, 3.79 ve 3.88'dir. Bu durum fen bilimleri öğretmenlerinin insan-doğa arasındaki ilişkiye yönelik daha pozitif bir tutuma sahip olduğunu göstermektedir. Bununla beraber alt boyutlar açısından inceleme yapıldığında, Tablo 4'e göre, ortaokul öğrencilerinin cevapları, insan merkezli görüşler için ortalama 3.16 (SS = 1.33) ve doğa temelli görüşler için 3.82'dir (SD = 1.14). Fen bilimleri öğretmen adaylarının ortalama puanları insan merkezli görüşler için 3.65 (SS = 1.12) ve doğa merkezli görüşler için 3.93'tür (SS = .97). Son olarak, fen bilimleri öğretmenlerinin insan merkezli görüşler için ortalama puanları 3.81 (SD = 1.23) ve doğa merkezli görüşler için 3.97'dir (SD = 1.05).

3.1.2. Temel Değerler

Araştırmanın amaçları arasında öğrencilerin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin temel değerlere yönelik görüşlerinin incelenmesi de yer almaktadır. Bu nedenle, bu bölümde bu amaca yönelik analizler yer almaktadır. Tablo 5'te ortalamalar ve üç örneklem grubuna göre ortalamaları ve standart sapmaları içeren tanımlayıcı istatistikler verilmiştir. Tablo 5'e göre, ortaokul öğrencilerinin, egoistik değer ortalamaları 3.40 (SD = .87), özgeci değer için 4.42 (SD = .69) ve biyosferik değer için 4.47'dir (SD = .62). Fen bilimleri öğretmen adaylarının ortalama puanları ise egoistik değerler için 3.61 (SD = .78), özgeci değerler için 4.58 (SD = .51) ve biyosferik değerler için 4.60 (SD = .47) 'dir.

Tablo 5 Temel değerlere yönelik tanımlayıcı istatistik sonuçları

Örneklem Grubu	Egoistik		Özgeci		Biyosferik	
	M	SD	M	SD	M	SD
Ortaokul Öğrencileri	3.40	.87	4.42	.69	4.47	.62
Fen Bilimleri Öğretmen Adayları	3.61	.78	4.58	.51	4.60	.47
Fen Bilimleri Öğretmenleri	3.46	.71	4.52	.48	4.64	.44
TOPLAM	3.44	.84	4.45	.64	4.51	.58

Son olarak, fen bilimleri öğretmenlerinin ortalama puanı, egoistik değer için 3.46 ($SD = .71$), özgeci değer için 4.52 ($SD = .48$) ve biyosferik değer için 4.64 ($SD = .44$)'dir. Bu sonuçlar her üç örneklem içinde biyosferik değer ortalamasının ($M = 4.51$, $SD = .58$) en yüksek, özgeci değer ortalamasının ($M = 4.45$, $SD = .64$) ise egoistik değer ortalamasından ($M = 3.44$, $SD = .84$) yüksek olduğunu göstermiştir. Ayrıca, örneklem grubu açısından karşılaştırıldığında, fen bilimleri öğretmen adaylarının ortalama puanlarının egoist ve özgeci değerlerde en yüksek olduğu, fen bilimleri öğretmenlerinin ortalama puanlarının ise biyosferik değerde en yüksek olduğu görülmektedir.

3.1.3. Kişisel Normlar

Araştırmanın amaçları arasında öğrencilerin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin kişisel normlara yönelik görüşlerinin incelenmesi de yer almaktadır. Bu nedenle, bu bölümde bu amaca yönelik analizler yer almaktadır. Tablo 6'da ortalamalar ve üç örneklem grubuna göre ortalamaları ve standart sapmaları içeren tanımlayıcı istatistikler verilmiştir. Tablo 6'ya göre, ortaokul öğrencilerinin kişisel norm puan ortalamaları 4.19 ($SD = .65$), fen bilimleri öğretmen adaylarının 4.45 ($SD = .49$) ve fen bilimleri öğretmenlerinin ise 4.51'dir ($SD = .45$). Bu sonuçlar fen bilimleri öğretmenlerinin fen bilimleri öğretmen adaylarından ve ortaokul öğrencilerinden daha yüksek ortalama puana sahip olduğunu göstermiştir.

Tablo 6 Kişisel normlara yönelik tanımlayıcı istatistik sonuçları

Örneklem Grubu	M	SD
Ortaokul Öğrencileri	4.19	.65
Fen Bilimleri Öğretmen Adayları	4.45	.49
Fen Bilimleri Öğretmenleri	4.51	.45
TOPLAM	4.27	.62

3.1.4. Öz-Kimlik

Araştırmanın amaçları arasında öğrencilerin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin öz-kimlik ölçeğine yönelik görüşlerinin incelenmesi de yer almaktadır. Bu nedenle, bu bölümde bu amaca yönelik analizler yer almaktadır. Tablo 7'de ortalamalar ve üç örneklem grubuna göre ortalamaları ve standart sapmaları içeren tanımlayıcı istatistikler verilmiştir.

Tablo 7. Öz-Kimlik ölçeğine yönelik tanımlayıcı istatistik sonuçları

Örneklem Grubu	M	SD
Ortaokul Öğrencileri	3.94	.75
Fen Bilimleri Öğretmen Adayları	4.08	.64
Fen Bilimleri Öğretmenleri	4.32	.56
TOPLAM	4.00	.73

Tablo 7'ye göre, ortaokul öğrencilerinin öz-kimlik puan ortalamaları 3.94 (SD = .75), fen bilimleri öğretmen adaylarının 4.08 (SD = .64) ve fen bilimleri öğretmenlerinin ise 4.32'dir (SD = .56). Bu sonuçlar fen bilimleri öğretmenlerinin fen bilimleri öğretmen adaylarından ve ortaokul öğrencilerinden daha yüksek ortalama puana sahip olduğunu göstermiştir.

3.2. Yol Analizi

Bu araştırmanın araştırma problemleri arasında ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya görüşleri, temel değerleri, kişisel normları ve öz kimlikleri arasında nasıl bir ilişkiyi incelemek yer almaktadır. Bu amacı yerine getirmek için bir model çizilmiş ve yol analizi yapılmıştır. Modelde öz kimlik, egoistik değer, özgecil değer, biyosferik değer, doğa temelli ekolojik dünya görüşü, insan temelli ekolojik dünya görüşü ve kişisel norm olmak üzere yedi sabit değişken vardır. Analiz ayrı ayrı üç örnek grup için üç adımda sunulmuştur: (1) önerilen modelin tanımlanması, (2) model için uyumluk, (3) ve modeldeki değişkenlerin doğrudan, dolaylı ve toplam etkileri.

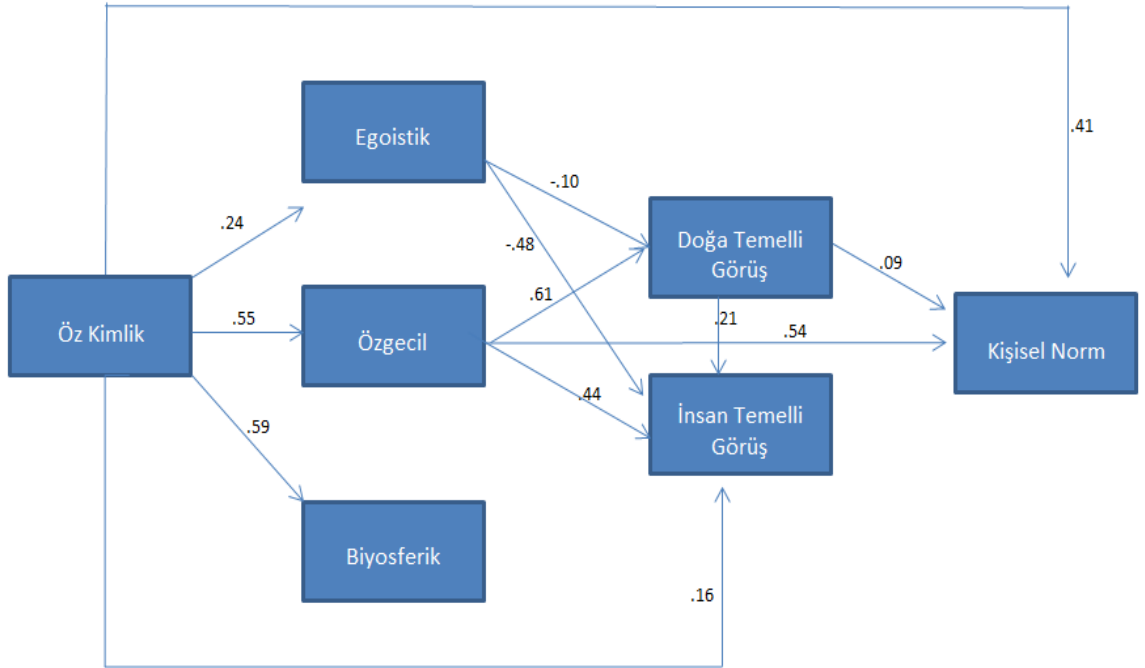
İlk olarak, teorik model ortaokul öğrencileri, fen bilimleri öğretmen adayları ve fen bilimleri öğretmenleri ile test edilmiştir. Daha sonra, modeldeki anlamlı olmayan yollar silinmiştir. Modelin verilere uygun olup olmadığını ortaya çıkarmak için modelin uyum indeksleri incelenmiştir (Tablo 8).

Tablo 8. Model Uyum İndeksleri

Uyum İndeks	Hesaplanan Değer			Kabul
	Öğrenci	Öğretmen Adayı	Öğretmen	Edilen Değerler
χ^2	2056.70	1474.74	1640.32	küçük
df	655	667	669	-
χ^2 /df	3.14	2.21	2.45	$2 < < 5$
χ^2 anlamlılık (p)	$p > .05$	$p > .05$	$p > .05$	$p < .05$
CFI	.92	.91	.91	$> .90$
RMSEA	.03	.04	.05	$< .08$
SRMR	.03	.05	.06	$< .08$

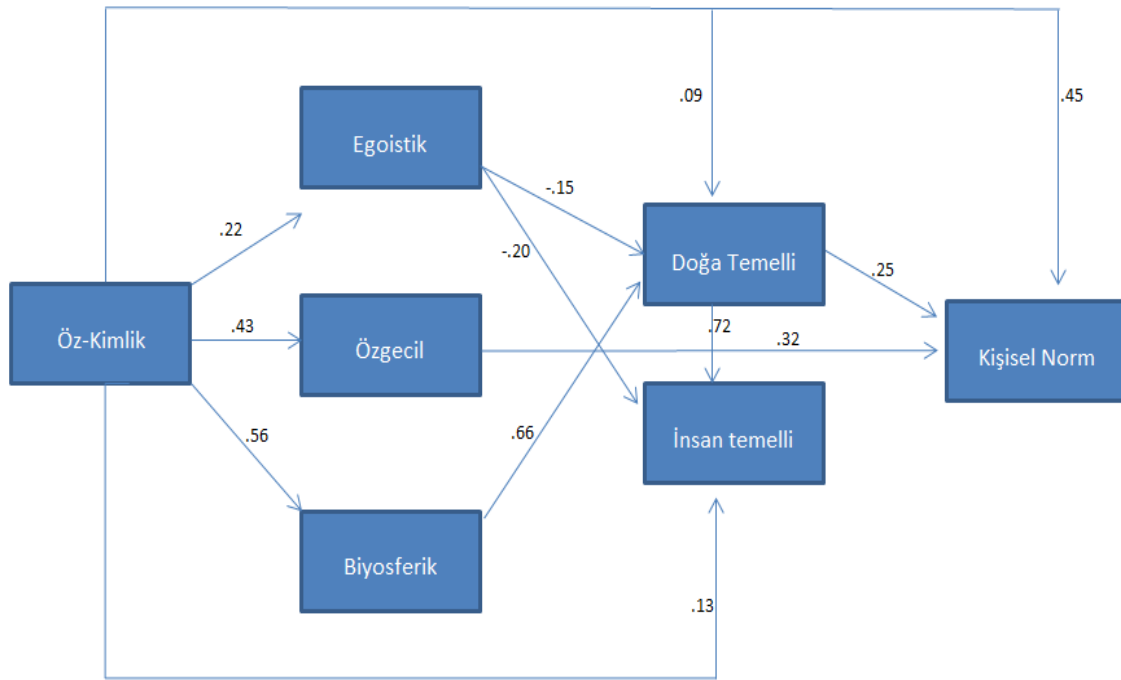
Tablo 8'e göre, modelin uyum indekslerinde yer alan bütün değerler araştırmacılar tarafından önerilen değerlerin arasında yer aldığı görülmektedir. Açıklayıcı faktör analizi ve literatürde yer alan bulgulara dayanarak, ortaokul öğrencilerinin, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin ekolojik dünya

görüşü, temel değerler, kişisel norm ve öz kimlik arasındaki ilişkileri açıklayan yol modeli geliştirilmesinin ardından tüm örneklem grupları için doğrudan, dolaylı ve toplam etkiler ayrı ayrı verilmiştir. Yol katsayılarının yorumlanması Cohen (1988) kriterleri ile sağlanmıştır. Kriterlere göre, standartlaştırılmış yol katsayısı (β), .10'dan küçükse, küçük etki; 0,30'a yakınsa, orta düzeyde etki ve 0,50'den büyükse büyük etki anlamına gelmektedir. İlk olarak ortaokul öğrencilerinin ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlikleri arasındaki ilişkileri açıklayan kavramsal model analiz edilmiştir. Bu değişkenler içerisinde bazıları istatistiksel olarak anlamlılık göstermediği için analizden çıkartılmıştır. Örneğin, egoistik değer ve kişisel norm, Biyosferik değer ve kişisel norm, Biyosferik değer ve insan merkezli görüş, Biyosferik değer ve doğa merkezli görüş ve öz-kimlik ve doğa merkezli görüş arasındaki yol analizleri modelden çıkartılmıştır. Yol analizi modelde en son değişken olarak ele alınan kişisel normu %80 olarak açıklamıştır. Değişkenler arasındaki standartlaştırılmış yol katsayıları -0.48 ile .61 arasında değişmektedir. Değişkenler arasındaki standartlaştırılmış yol katsayıları Şekil 2' de gösterilmiştir.



Şekil 2. Ortaokul öğrencilerinin ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlikleri arasındaki ilişkileri gösteren standartlaştırılmış yol katsayıları

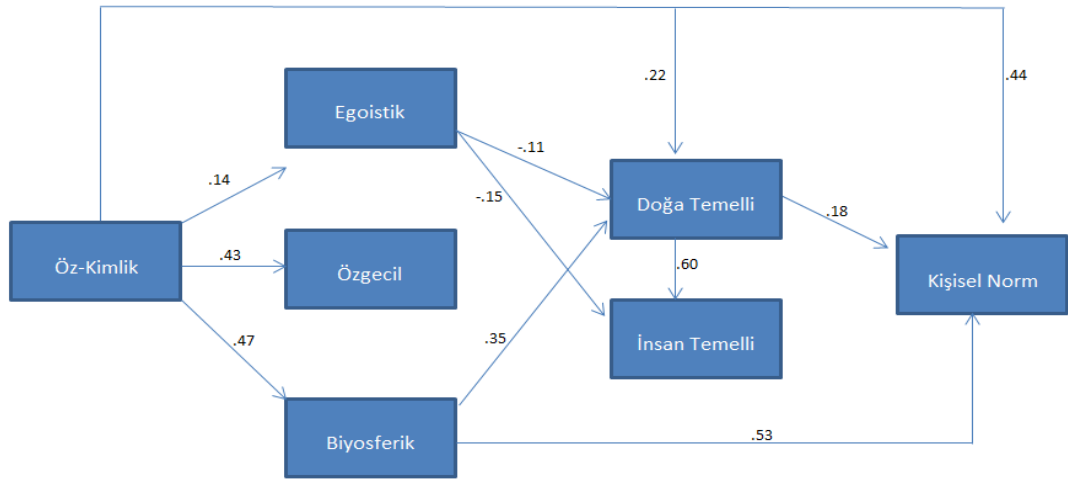
İkinci olarak fen bilimleri öğretmen adaylarının ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlikleri arasındaki ilişkileri açıklayan kavramsal model analiz edilmiştir. Bu değişkenler içerisinde bazıları istatistiksel olarak anlamlılık göstermediği için analizden çıkartılmıştır. Örneğin, egoistik değer ve kişisel norm, Biyosferik değer ve kişisel norm, özgecil değer ve doğa merkezli görüş, Biospheric değer ve insan merkezli görüş, insan merkezli görüş ve kişisel norm ve özgecil değer ve insan merkezli görüş arasındaki yol analizleri modelden çıkartılmıştır. Yol analizi modelde en son değişken olarak ele alınan kişisel normu %68 olarak açıklamıştır. Değişkenler arasındaki standartlaştırılmış yol katsayıları -.20 ile .72 arasında değişmektedir. Değişkenler arasındaki standartlaştırılmış yol katsayıları Şekil 3’ de gösterilmiştir.



Şekil 3. Fen bilimleri öğretmen adaylarının ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlikleri arasındaki ilişkileri gösteren standartlaştırılmış yol katsayıları

Son olarak fen bilimleri öğretmenlerinin ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlikleri arasındaki ilişkileri açıklayan kavramsal model analiz edilmiştir. Bu değişkenler içerisinde bazıları istatistiksel olarak anlamlılık göstermediği için analizden çıkartılmıştır. Örneğin, egoistik değer ve kişisel norm, öz-kimlik ve insan merkezli görüş, Biyosferik değer ve insan merkezli

görüş, insan merkezli görüş ve kişisel norm, özgecil değer ve doğa merkezli görüş, özgecil değer ve kişisel norm ve özgecil değer ve insan merkezli görüş arasındaki yol analizleri modelden çıkartılmıştır. Yol analizi modelde en son değişken olarak ele alınan kişisel normu %59 olarak açıklamıştır. Değişkenler arasındaki standartlaştırılmış yol katsayıları $-.15$ ile $.60$ arasında değişmektedir. Değişkenler arasındaki standartlaştırılmış yol katsayıları Şekil 4’ de gösterilmiştir.



Şekil 4. Fen bilimleri öğretmenlerinin ekolojik dünya görüşü (NEP), temel değerler, kişisel norm ve öz kimlikleri arasındaki ilişkileri gösteren standartlaştırılmış yol katsayıları

3.3. Sonuç

Bu çalışma kapsamında ortaokul öğrencileri, fen bilimleri öğretmen adayları ve fen bilimleri öğretmenlerinden oluşan üç örneklemin içerisinde yer aldığı birer tane model önerilmiş ve test edilmiştir. Önceki çalışmaların sonuçlarından toplanan teorik ve deneysel sonuçların temeli ile oluşturulan modellerde bazı değişkenlerle açıklanmıştır. Açıklanan toplam varyansa ilişkin bilgiler Tablo 9'da verilmiştir.

Tablo 9. Modelde Açıklanan Toplam Varyansa İlişkin Bilgiler

Örneklem	Varyans (%)
Ortaokul Öğrencileri	80
Fen Bilimleri Öğretmen Adayları	68
Fen Bilimleri Öğretmenleri	59

Tablo 9'a göre, açıklanan varyanslar en yüksek oranında (%80) öğrenciler ile yapılan analiz sonucunda ortaya çıkarken, ikinci sırada ise fen bilimleri öğretmen adayları ile yapılan analiz sonucunda açıklanan varyans %68 olmuştur. Son olarak ise en düşük orana sahip olan fen bilimleri öğretmenleri ile yapılan analiz sonucunda açıklanan varyans %59 olmuştur. Öz kimliğe ilişkin yol modellerine bakıldığında, öz kimliğin egoistik değer ve biyosferik değer üzerindeki en güçlü pozitif etkisi ortaokul öğrencilerine, en düşük etki ise fen bilimleri öğretmenlerine aittir. Öz-kimliğin özgecil değer üzerindeki en güçlü pozitif toplam etkisi ortaokul öğrencilerine ve fen bilimleri öğretmen adaylarına, en düşük etki ise fen bilimleri öğretmenlerine aittir. Yani, bu çalışmada çevre konusunda kendileri hakkında olumlu algılara sahip olan kişilerin, diğer insanların refahına vurgu yapmaları, insanlık dışı türlere veya biyosferlere odaklanmaları ve bitkiler ve hayvanlar da dahil olmak üzere tüm canlılar ile ilgilenmeleri muhtemeldir. Ayrıca, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin öz-kimlik inançlarının doğaya dayalı görüşleri üzerinde istatistiksel olarak anlamlı bir etkisi olurken, ortaokul öğrencilerinin öz-kimlik inançlarının doğaya dayanan görüşleri üzerinde istatistiksel olarak anlamlı bir etkisi yoktur. Ortaokul öğrencilerinin öz-kimlik inançları insan temelli görüşleriyle olumlu yönde ilişkilidir, bu ilişki fen bilimleri öğretmen adaylarının öz-kimlikleri ile insan-temelli görüşleri arasında ise negatif yöndedir. Ayrıca fen bilimleri öğretmenlerinin öz kimlikleri ile insan temelli görüşleri arasında anlamlı bir ilişki yoktur. Başka bir deyişle, çevre konusunda kendileri hakkında olumlu algılara sahip olan ortaokul öğrencileri olumlu insan temelli görüşlere sahipken, çevre sorunları hakkında kendileri hakkında olumlu algılara sahip olan öğretmen adaylarının olumsuz insan merkezli görüşlere sahip olma eğilimindedir. Son olarak, üç örneklem grubunun öz kimlikleri kişisel normlarıyla ilgilidir. Yani, bu çalışmada çevre konusunda kendileri hakkında olumlu algılara sahip olan kişilerin, kendileri için sahip oldukları kişisel normlara ilişkin görüşleri de olumlu yönde olma eğilimindedir. Egoistik değerın etkisi göz önüne alındığında, doğa temelli görüşler üzerindeki etkisi üç örnek grup için neredeyse aynıdır; insan temelli görüşler üzerindeki etkisi ise, ortaokul öğrencilerinde fen bilimleri öğretmen adaylarına ve fen bilimleri öğretmenlerine

göre çok daha negatif yöndedir. Başka bir deyişle, doğal kaynakları kullanma bakımından kendi çıkarlarına ve isteklerine önem veren ortaokul öğrencileri daha fazla insan merkezli görüşlere sahip olma eğilimindedir. Özgecil değerinin etkisi göz önüne alındığında, örneklem grupları arasında, özgecil değer ve doğa temelli görüş ile insan temelli görüş arasındaki ilişki yalnızca ortaokul öğrencileri açısından anlamlı iken, Özgecil değerinin kişisel normlar üzerindeki etkisi ise ortaokul öğrencileri ve fen bilimleri öğretmen adayları açısından anlamlıdır. Yani, başkalarının refahına önem veren ortaokul öğrencilerinin doğaya daha bakış açısına, insan bakış açısına ve insanların kendileri için sahip oldukları kişisel normlara ilişkin beklentilerine sahip olmaları muhtemeldir. Fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin biyosferik değerleri doğaya dayalı bakış açısını etkilerken, sadece fen bilimleri öğretmenlerinin biyosferik değerleri kişisel normları üzerinde etkilidir. Benzer şekilde, fen bilimleri öğretmen adaylarının ve fen bilimleri öğretmenlerinin doğa temelli görüşleri, insan temelli görüşleri ve kişisel normları ile ilgilidir. Başka bir deyişle, çevre odaklı algılara sahip fen bilimleri öğretmen adayları ve fen bilimleri öğretmenleri, kendileri için sahip oldukları kişisel normlarla ilişkilidir.

Bu çalışma öğrencilerin inanç, değer ve normlarının insan-doğa ilişkisinin önemli bileşenlerinden biri olarak kabul edilebileceğini göstermiştir. Bu çalışmada Ortaokul öğrencileri, NEP, temel değerler, kişisel normlar ve öz-kimlik dahil olmak üzere, fen bilimleri öğretmen adaylarına ve fen bilimleri öğretmenlerine göre daha az çevresel farkındalığa sahip olduğu bulunmuştur. Araştırmanın ortaya koyduğu gibi, Türkiye'deki ortaokullarda neredeyse tüm eğitim düzeylerinde, çevre sorunlarıyla ilgili konular müfredata dahil edilmiştir. Öğretmenler yerel ve küresel çevre sorunlarının yanı sıra temel ekolojik kavramların öğretilmesine de dikkat etmelidirler. Bu nedenle, eğitimciler ve araştırmacılar bu psikolojik değişkenlerin ve öğrencilerin eğitimindeki öneminin farkında olmalıdır. Ayrıca, ilköğretim fen bilimleri eğitim öğretim programında öğrencilerin inançlarını, değerlerini, kişisel normlarını ve çevreye yönelik öz kimliklerini geliştirmeye yönelik çalışmalar, çevre psikolojisi alanındaki uzman ve akademisyenlerin desteği ile geliştirilmelidir.

Bu sonuçlar, fen bilimleri öğretmen adaylarının ortaokul öğrencilerinden insan-doğa ilişkisi konusunda daha bilinçli olduklarını gösterse de, müfredat geliştiricilerin ve akademik personelin temel ekolojik kavramların yanı sıra yerel ve küresel çevre sorunlarının öğretimine daha fazla dikkat etmesi öğrenci başarısı açısından yararlı olabilir. Ayrıca, ekolojik konularla ilgili derslerin sayısı arttırılmalıdır. Fen bilimleri öğretmen adayları hala lisans düzeyinde eğitim görmektedir ve amaçlanan temel değerler, ekolojik dünya görüşlerine, kişisel normlara ve öz kimliğe yönelik bilincin sağlanmasına sağlanmalıdır. Bununla beraber fen bilimleri öğretmenliği için gerekli eğitim öğretim ortamı da sağlanmalıdır.

Öğretmen eğitimi açısından bakıldığında, sonuçlar fen bilimleri öğretmenlerinin ortaokul öğrencilerinden ve fen bilimleri öğretmen adaylarından daha iyi ekolojik farkındalıklara sahip olduklarını göstermiştir. Ancak, çevre sorunları ile ilgili öğrenci eğitimi önemlidir ve ortaokul düzeyinde bu eğitim fen bilimleri öğretmenleri tarafından sağlanmaktadır. Ayrıca öğretmenler, eğitimciler, araştırmacılar ve politika yapıcılar hizmet içi eğitimlerinin bir parçası olarak küçük atölye çalışmaları ve toplantılar düzenlemek için işbirliği yapabilirler. Öğretmenlere, özel öğretim yöntemleri ve öğretim stratejileri ve öğrencilerin çevreye yönelik inançlarını, değerlerini, kişisel normlarını ve öz kimliklerini geliştirmek için bunları sınıfta nasıl kullanacakları hakkında seminerler verilebilir. Ayrıca öğretmenler, sınıf etkinliklerini tasarlarken ve fen dersleri için öğretim yöntemlerini seçerken insan-doğa ilişkisini vurgulamalıdır.

Çalışmada geçerli ve güvenilir ölçekler ile beraber üç örneklem grubunda test edilen başarılı bir model sunulmuştur. Bu nedenle, bu araştırmadaki elde edilen sonuçlara dayanarak daha fazla araştırmacı, ilgili literatüre ve çalışmalarına katkıda bulunabilecek ölçekleri ve önerilen modeli kullanabilir. Bu çalışma aynı zamanda Çevre Eğitimi ve Çevre Psikolojisi literatürüne de katkıda bulunabilecektir.

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