



Comparing Predictors of Teachers' Education for Sustainable Development Practices among Eco and Non-Eco Preschools *

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Abstract

Theory and practice of Education for Sustainable Development (ESD) in early childhood education (ECE) is still an emerging issue in all over the world. ESD practices should be integrated into existing ECE programs considering the role of eco-school program and preschool teachers at all levels of education both in nationwide and worldwide. Eco-schools program is one of the best practices representing ESD in formal education system. In addition, early childhood teachers either working at eco-preschools or not, is the main vehicle in inclusion of ESD teaching practices into existing curriculum. In the current study, early childhood educators' knowledge about Sustainable Development (SD), attitudes towards SD, childhood location and household type, Non-Governmental Organization (NGO) membership, and previous experiences on implementing ESD related activities were investigated as the possible predictors of ESD teaching practices in eco and non-eco preschools. The results of the Hierarchical Linear Modeling (HLM) analyses revealed that NGO membership of preschool teachers along with their attitudes are the predictors of ESD teaching practices in eco preschools. On the other hand, previous experiences on implementing ESD related activities and attitudes towards SD are associated with teachers' ESD practices in non-eco preschools. In conclusion, the current study captures the existing situation of ESD integration into ECE curriculum on the behalf of preschool teachers. It may be reminded that teachers are the most important human resource for promoting ESD.

Keywords

Education for sustainable development practices
Early childhood education
Eco-schools program
Eco-preschools
Hierarchical linear modeling

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Introduction

Recently 2030 Agenda for Sustainable Development reaffirmed the central vision of this century as giving everyone the opportunity to transform the world by learning the values and behaviors required for a sustainable lifestyle emphasizing role of education (United Nations, 2015). Education for Sustainable Development (ESD) with three integrated and interrelated dimensions in terms of environmental, social-cultural, and economic was regarded as a key in solving the problems that we face in the 21st century (UNESCO, 1992, 1997). ESD mainly encompasses the patterns of ecologic life, initiative for social change, and conscious consumption (UNESCO, 2005). Existing educational programs should be reoriented towards ESD starting from early childhood to strengthen thoughts, attitudes, beliefs, and practices for a sustainable future (UNESCO, 2012). Since early years of life are regarded as having potential to transform the communities, ESD in early childhood education is whispered as a “natural starting point” for lifespan learning (Didonet, 2008; UNESCO, 2007, 2008).

As one looks at the development of ESD in early childhood education (ECE), it is comprehended that many developed countries like Sweden, England, and Australia do not assume a secondary educational program different from existing one to promote ESD practices (Siraj-Blatchford & Pramling-Samuelsson, 2016). Rather, they exhibit an integrated approach by incorporating ESD content into their existing program as UNESCO (2005) proposed. In the context of Turkey, ECE services framed on the national ECE program (Ministry of Education [MONE], 2013) highlights an integrated approach, which supports children’s whole development. The program was developed for 36-72 months old children focusing on their developmental characteristics with a holistic approach. In addition, outcomes and indicators, which should be acquired by children, were determined for each developmental domain (MONE, 2013). When the existing ECE program is examined with the lens of ESD, it is perceived that some of the objectives and indicators are appropriate for planning and conducting the ESD practices. In other words, the Turkish National ECE program puts an emphasis on ESD in an implicit manner. To illustrate, cognitive and language development areas in the program include objectives and indicators which enhance children’s reasoning, problem solving and self-expression skills as suggested by ESD. Likewise, social-emotional developmental area offers outcomes like “recognizing the social and cultural characteristics”, “being aware of and owning their roles in social life”, as well as “getting to know and respecting different cultures with a universal point of view” which can be related with ESD practices. Similarly, the special days - weeks and concepts, which should be included in the program, stimulate ESD practices in preschools (Kahriman & Güler-Yıldız, 2017). Thus, Turkish National Early Childhood Education program is well placed with aims and contents of ESD. In this regard, research demonstrates that preschool teachers can plan and conduct ESD practices by using objectives and indicators as well as concepts included in the existing national program (Alicı 2013; Cengizoğlu, 2013).

Although Education for Sustainable Development (ESD) practices could be integrated into ECE programs both in national and international level, there is still a need for special programs and projects to promote ESD in worldwide. In this context, as suggested by United Nations Environment Program (UNEP), eco-schools program is one of the good examples of ESD practices at different levels of education both in nationwide and worldwide (FEE Eco-Schools, 2015). In fact, the origins of the eco schools program is referred in Agenda 21 and Chapter 25 underlining children’s role in environmental protection and social-economical promotion (UNESCO, 2003; United Nations Conference on Environment and Development [UNCED], 1992). The program is being implemented in 56 countries around the world, involving 32156 schools, 9125460 students, 628005 teachers, and 5013 local authorities (FEE Eco-Schools, 2015). Eco-schools program has both indoor and outdoor learning opportunities,

which is related with daily life of children (Bajd & Leščanec, 2011; Korkmaz & Güler-Yıldız, 2017). In contrast to one off workshops, materials, or program integration, eco-schools program is an exceptional model for long-term ESD practices. Seven steps can be followed in terms of “forming an eco-school committee; carrying out environmental review; preparing an action plan; monitoring and evaluating the process; doing curriculum work; informing and involving everyone, and producing an eco-code” (Pröpsting, Štroffeková, Hollmann, & Crost, 2010, p.6) which should be approved by Eco-school candidates. In addition to seven-step methodology, the eco-school program adapts 12 main themes. These are; biodiversity and nature, climate change, energy, food, global citizenship, health and wellbeing, litter, marine and coast, school grounds, transport, waste, and water. The eco-schools program promotes knowledge, perceptions, attitudes, beliefs, and behaviors of children, teachers and other staff about sustainable development in a professional way (FEE Eco-Schools, 2013). In conclusion, eco-preschools may be considered as the main vehicles referring to ESD issues in early childhood education. In other words, eco-preschools are deemed to be demonstrating ‘good’ practice’ for ESD (UNESCO, 2012).

Eco-school program adapts a holistic approach to promote a sustainable life. Teachers, school administration, other staff and especially children are encouraged to collaborate during eco-school program implementation. Children are the most important and integrative factor in eco-school program. Their active participation in this process is essential to raise awareness of parents and community regarding sustainable development (FEE Eco-schools, 2013).

Education for Sustainable Development (ESD) was described as a teaching and learning approach promoting ideas and principles that point out sustainable development (UNESCO, 2009). In this regard, knowledge and attitude were defined in the Belgrade Charter as two important constructs for ESD practices. People acquire a basic understanding of the environmental, socio-cultural and economic issues and associated problems through sustainable development knowledge and they obtain concern and inspiration for the environment to take initiative for environmental, social-cultural and economic problems (UNESCO, 1976).

Education for Sustainable Development (ESD) practices of preschool teachers can refer to some important ideas. Initially, teachers may comprehend what is sustainable development and how to teach it to young children. Preschool teachers, who are knowledgeable about ESD, may integrate ESD into developmentally appropriate early childhood education practices to make sustainable development relevant with children’ daily life and practice (Green, 2013). Additionally, preschool teachers can be conscious about referring to three integrated dimensions of sustainable development including environmental, social- cultural, and economic in ESD practices (Samuelsson, 2011). Duncan (2011), recommended the framework of 7R (respect, rethink, reflect, reduce, reuse, recycle, and redistribute) to exemplify ESD practices into preschool settings. These kinds of ideas can guide educators what to and how to integrate ESD practices into curriculum.

UNESCO (2012) regarded teachers, working at both eco and non-eco preschools, as the most important dynamics to enhance ESD in society. Alelaimat and Taha (2013) and Henderson and Tilbury (2004) emphasize roles of preschool teachers in this process and recommend teachers to practice sustainability in their classrooms. When the relevant literature was examined, a variety of studies was reported examining the differences among eco-schools and non-eco schools. These studies focused on environmental education in terms of environmental knowledge (Aktepe & Girgin, 2009), environmental literacy (Krnel & Naglic, 2009), and environmental awareness and attitudes (Hallfreðsdóttir, 2011). When the early childhood education practices in Turkey are examined through sustainability, research

revealed that Turkish preschool teachers implicitly refers to ESD in ECE settings (Kahriman Öztürk, Olgan, & Güler, 2012). Similarly, Korkmaz and Güler-Yıldız (2017) highlighted the existence of educational stimuli about ESD. Kahriman Pamuk and Olgan (2018) also examined physical characteristics and teacher practices of eco and non-eco pre-school education institutions about sustainability and reported that eco pre-schools had a more appropriate physical structure compared to non-eco ones in ESD practices. In addition, Huz and Kalburan (2017) found that eco-preschools provide more physical opportunity for teachers and children to spend time in school garden; yet, the time spend and the activities were reported as similar. Bearing in mind these features accentuated above, in this study, ESD practices of preschool teachers serving at eco versus non-eco preschools were compared. At that point, the current study has provided an opportunity to compare preschool teachers' ESD practices and predictors of them.

Possible Predictors of Preschool Teachers' ESD Practices

Although ESD is an emerging issue in the early years, the literature holds a dearth of evidence about educator's ESD practices and related predictors. Instead, research on environmental education underlined teacher outcomes modeling a plenty of variables. In the current study, this gap in existing ESD literature is aimed to be filled utilizing partially Environmental Education research.

Knowledge and Attitude

Previous environmental education research discussed attitude and knowledge as predictors of environmental practices. According to the knowledge – attitude model proposed by Hungerford and Volk (1990), there is a linear relationship between environmental knowledge, attitude and practices. Schultz (2002) contradicted that there may not be a direct relationship among environmental knowledge and environmental behavior, and declared that environmental attitude may motive the relationship among knowledge and practices.

Knowledge about sustainable development refers to being able to understand concepts about sustainable development (Laroche, Bergeron, & Barbaro-Forleo, 2001). Preschool teachers' knowledge about sustainable development might be taken into consideration meanwhile as discussed before preschool teachers have a key role in introducing the concept of sustainable development to children (World Commission on Environment and Development [WCED], 1987). Flogaitis and Agelidou (2003) reported that teachers could not take active role in supporting children's active role in environmental issues due to their lack of environmental knowledge. Likewise, Bursjö (2011) reported that teachers regard lack of knowledge as barriers to ESD practices. Essentially, teachers have limited knowledge about how to teach ESD. Moreover, they find ESD difficult to teach since it is a contradicted and conflicted issue for teaching. Considering these aspects, in the current study, it is assumed that the more preschool teachers are knowledgeable about sustainable development and how to teach it, the more they can conduct ESD practices.

Attitude is about feeling positive or negative and responding favorably or unfavorably towards an object or a class of objects. An attitude includes affective, cognitive and behavioral components and it is properly accepted in the literature that any change in attitude is reflected in practice (Fishbein & Ajzen, 1975; Zimbardo, Ebbesen, & Maslach, 1977; Wray-Lake, Flanagan, & Osgood, 2010). Attitudes towards sustainable development (SD) means tendency to favor or not a given object or situation about SD. In educational science, positive attitudes are related with good teaching practices (Pajares, 1992; Peck & Tucker, 1973). Esa (2010) regarded attitude as a key element affecting educators' environmental education practices. Similarly, Biasutti & Frate, (2017) reported that developing positive attitudes towards SD might result in the implementation of SD-related activities in classrooms. In this regard, the

current study assumes that preschool teacher's attitudes towards sustainable development is a key element that affecting their ESD practice.

To conclude, as discussed in environmental education research, attitude and knowledge are predictors of environmental practices (Hines, Hungerford, & Tomera 1987). From this point of view, as Boutte (2008) proposed, SD knowledge and positive attitudes towards SD would be predictors of ESD practices in ECE settings. Accordingly, in this research, attitudes towards sustainable development and sustainable development knowledge were examined to be significant motives relating with preschool teacher's ESD practices.

Considering the findings from environmental education research and complexity of education for sustainable development, a more holistic approach is adapted in this study by including significant life experiences variables, which could be related with ESD practices.

Significant life experiences are a variety of demographic variables brought from childhood and previous practices like childhood location and household type, are considered as motives which is in relation with environmental knowledge, attitude and practices (Chawla, 1999; Palmer & Suggate, 1996). For example, Chawla (1999) reported that main dynamics for environmental practices were experiences in nature, influences by family, participation in organizations and previous environmental experiences. At this perspective, significant life experiences may also be motives affecting ESD practices. Hence, childhood location and household type, Non-Governmental Organization membership and past experiences are regarded and tested as variables to understand what motivate preschool teachers' ESD practices.

Childhood Location and Childhood Household Type

Childhood experiences and the time spent in nature during childhood are essential for nurturing respect and love for nature (Tanner, 1980). Indeed, natural experiences of individuals acquired during childhood are related with their pro-environmental behaviors (Hsu, 2009). In addition, Tanner (1980) proposed that childhood experiences also affect individuals' perceptions of social issues in terms of being "active and informed" citizenship and economic issues in terms of conserving resources. Compared to relevant literature, the notion is that location (urban/rural) and household type (apartment/detached house) may facilitate the natural experiences of children and such experiences may be resulted in developing positive attitudes towards environmentally responsible behaviors, which could turn in sustainable actions (Chawla, 1999; Hsu, 2009; Palmer, 1998; Tanner, 1980). For instance, reports of Palmer and Suggate (1996), Chawla (1999) and Sward (1999) conducted on different groups with different research techniques revealed that location (urban/rural) and household type (apartment/detached house) resided in during childhood might enhance individual's adulthood experiences related to environmental issues. In this respect, preschool teachers who have spent his/her childhood in rural areas and lived in a detached house are assumed likely to be knowledgeable about SD and to have positive attitudes towards SD; as well as to consider ESD practices in their classrooms.

Non-Governmental Organization (NGO) Membership

To achieve Sustainable Development (SD), Agenda 21 (UNCED, 1992) highlights role of non-governmental organizations suggesting that Non-Governmental Organizations (NGOs) might act with community. NGOs have trigger role in broadening quality of education worldwide. In this respect, Pe'er, Goldman, and Yavetz (2007) also reported that pre-service teachers who are members of NGOs struggle with environmental, economic and socio-cultural issues more than others. In addition, Goldman, Yavetz, and Pe'er (2006) also found a positive relationship between the students' engagement in NGOs and their act for environmental issues. This relationship may be clarified by the notion that

preschool teachers who are members of NGOs have greater exposure to environmental, economic and socio-cultural issues in their settings; therefore, they could have higher levels of ESD practices in their settings. In conclusion, NGOs can be best supporter of innovative way of teaching in education. In fact, NGO membership, in this study, is regarded as one of the variables predicting preschool teachers ESD practices reported.

Past ESD Experiences

Several studies indicate that past experience has a direct effect on behavior (Bentler & Speckart, 1979; Fredricks & Dossett, 1983). Similarly, past teaching experiences have positive effect on later teaching experiences (Ajzen, 1991). Indeed, Duerden and Witt (2010) proposed that past experiences catalyzed environmental knowledge into environmental behaviors. In this regard, Krajhanzl (2010) also commented that past experience of the individual is one of the factors influencing environmental practices. It may be inferred from Tanner (1980) and Chawla (1999) that personal experiences throughout life may influence ESD practices. In this regard, in the current study, preschool teachers' past ESD teaching experiences are defined as one of the predictors of their ESD practices.

Aim and Research Question

By comprehending these aspects highlighted above, in this study, Education for Sustainable Development (ESD) practices of preschool teachers serving at eco and non-eco preschools were compared along with the possible predictors of ESD practices of the early childhood teachers including their sustainable development (SD) knowledge, attitudes towards SD, childhood location, childhood household type, NGO membership, and previous ESD experiences. This study intended to investigate and compare possible predictors of preschool teachers' ESD practices across eco and non-eco preschools. Accordingly, main research problem motivating the current study is to what extent do teacher-related variables (knowledge about SD, attitudes towards SD, childhood location, household type at childhood, NGO membership and previous ESD experiences) explain the differences in preschool teacher's ESD practices across eco and non-eco preschools?

Method

Participants

Four big cities of Turkey that possess the largest eco-preschool population for public and private preschools (FEE Eco-Schools, 2015) were identified as the accessible population for this study. Two-stage sampling method was used to select the sample. Accordingly, a total of 48 eco preschools were selected. From these preschools, 349 preschool teachers (136 from Istanbul, 88 from Ankara, 62 from Antalya and 63 from Eskisehir) volunteered to participate in the study. In the second stage of sampling, an equal number of non-eco preschools were randomly selected from the same cities in order to make comparison. Accordingly, 63 non-eco preschools were selected. 489 preschool teachers (192 from Istanbul, 123 from Ankara, 85 from Antalya and 89 from Eskisehir) volunteered to participate in the study. Overall, 838 preschool teachers were included in the current study. Specifically, 41.6% of the teachers served in eco and 58.4% of them served in non-eco preschools. Almost all preschool teachers (98.3%) were female. Most of the teachers (73.4%) had one to 10 years of experience and 21.2% of them had 11 to 20 years of teaching experience.

Data Collection Instruments

Data were collected from the teachers via (1) questions about previous life experiences related environmental issues and (2) a series of scales. The first part included questions on childhood location, household type, NGO membership, and previous ESD experience and had two choices (Yes or No). Following scales were used in the second part of the study:

The Scale for Preschool Teacher's Knowledge about Sustainable Development: The scale was developed by Park, Kim, and Yu (2015) and adapted into Turkish by the researchers to be used with early childhood teachers in Turkey. It includes nine questions and is a three-choice Likert type scale (Agree, Disagree, and Uncertain). Sustainable Development (SD) embraces three integrated dimensions in terms of environmental, economic and socio-cultural that act together (UNESCO, 2005). Therefore, Park et al. (2015) considered SD in one factor that includes these three dimensions. The results of EFA and CFA (RMSEA=.068, S-RMR=.054, NFI=.941, CFI=.960, GFI=.967) supported one factor solution for SD, thus, knowledge scale was handled in one factor for this study. The Cronbach alpha coefficients were calculated as .81 (pilot study with 141 teachers) and .75 (main study with 838 teachers) for the current study.

The Preschool Teacher's Attitude towards Sustainable Development Scale was developed by Park et al. (2015) and adapted into Turkish by the researchers. It includes 30 questions and is a four-choice Likert type scale (Strongly agree, Agree, Disagree, and Strongly Disagree). The original attitude scale in the study of Park et al. (2015) had only economic and environmental dimensions. To ensure integrity, the researchers added 8 items that cover socio-cultural dimension. Then, scale was tested by conducting EFA and CFA. The EFA result indicated that the one-factor solution explained 49.9% of variance for the Attitude scale. Examining the scree plot, the curve begins to level off after the first factor. The results supported one factor solution for attitude scale. Sustainable development has three interrelated dimensions and it should be considered with a holistic approach in educational settings. Therefore, EFA result supported this idea. Also, this result was supported with CFA (RMSEA=.065, S-RMR=.067, NFI=.898, CFI=.916, GFI=.904). The Cronbach alpha coefficients were calculated as .96 (pilot study) and .94 (main study) for the current study.

During the translation procedure of these two scales, firstly, the items were reviewed for the content validity by two academicians, one of whom specialized in early childhood education and the other was expert in English Language Teaching and a preschool teacher to confirm that the items were clear and easy to understand. Then, the scale is reverse translated from Turkish language to English language. After this procedure, firstly, the context of the scale was reviewed to realize any consequence about cultural and linguistic differences that may be important for the planned population in terms of preschool teachers. Secondly, the language use in the items, directions, and rubrics were scanned to verify the appropriateness of cultural and linguistic concerns to preschool teachers employed in preschools in Turkey.

ESD is an emerging research area for early childhood studies. When the relevant literature was examined, no scale was found measuring preschool teachers' SD knowledge and SD attitude, which was developed or adapted to Turkish. In this regard, it was important for the literature to introduce these scales into Turkish.

The preschool teachers' ESD Practices Scale was the third scale in this study and was developed by the researchers to determine the teachers' practices in preschools with respect to sustainable development. The validity and reliability procedure were carefully planned and conducted to ESD Practice scale. The first issue taken into consideration while writing ESD practice items was the clarification of what can be an example of ESD practices in ECE. The decision was given based on the examples of ESD practices in international preschool education curriculums. Second issue considered was to refer the three integrated dimensions of SD in terms of environmental, economic and social-cultural into ESD practices. In this process, objectives of dimensions were listed and tried to be integrated with national preschool education curriculum. The last issue considered was the decision of

item of formats. After reviewing similar practice scales in the relevant literature, Likert type used in the scale and the time interval between choices was identified based on the schedule of national preschool education program. Accordingly, 24 items with a five-choice Likert type scale was developed and content and format of the scale were examined by three experts specialized in SD and early childhood education. The scale also examined by three preschool teachers. EFA results indicated that one-factor solution explained 38.9% of variance and two-factor solution explained 44.1% of variance for practice scale. In addition, the scree plot in EFA was used to decide the number of factors to retain. Examining the scree plot, the curve begins to start level off after third factor. However, similar to previous measurements, one-factor solution was preferred for this scale, because the integrated structure of ESD. Additionally, CFA results did not show any problem for one factor solutions (RMSEA=.062, S-RMR=.065, NFI=.909, CFI=.902, GFI=.912). According to the test results, Cronbach alpha coefficients score was .85 for the pilot study (n=141) and .88 for the main study (n=838). Item examples are given below: "We prefer to use materials made by glass or paper instead of plastic during activities". "We monitor water consumption in the school". "We take human rights into consideration when setting our classroom rules".

Data Collection Procedure

When the research was conducted, the ethical protocols approved by University's Human Research Ethic Committee as well as Turkish Ministry of National Education were followed. In the fall semester of 2014-2015 academic year, a pilot study was designed and conducted with 141 preschool teachers to validate Knowledge about Sustainable Development (SD) and Attitude towards SD Scale, and SD Practices Scale. The main study was conducted during the spring semester of 2014-2015 academic year. Before the questionnaires, the researchers read the directions to the participants and informed them about the confidentiality. The data of the study were conducted in a single time and preschool teachers filled the whole questionnaire about 40 minutes. To protect confidentiality, any information of preschool teachers were not collected. All of data were kept confidential and only used for research purposes.

Analysis of Data

Hierarchical Linear Modelling (HLM) was used to investigate the relations within preschool teacher's related variables in terms of knowledge, attitude, childhood location, childhood household type, NGO membership, and previous teaching experiences. Before the analysis, data were cleaned from missing values, because HLM does not run if there are missing values at level 1. After cleaning data, main assumptions of HLM were checked, such as linearity, normality, outliers, etc. Then, the outcome variables were determined as preschool teachers' Education for Sustainable Development (ESD) practices for eco and non-eco preschools for two different models. The data gathered from preschool teachers and their school types have a nested structure. It means that teachers who work in a same school type might be more similar than the teachers who work in other school type. Nested structure of the sample of this study was the reason to choose HLM to examine the data. HLM offers different regression models for teacher groups that draw an outline by using structural relations and residual variability at that level. At the end of the analyses, it can be investigated how teachers' variables interrelated in their level and how school type mediate teachers' level variables.

Results

Descriptive Results

According to the results, most of the teachers who were serving at both types of preschools lived in rural area and more than half of them lived in apartments during their childhood. Most of them also had membership to a Non-Governmental Organization (NGO). Another result was related to teachers' previous experiences. The results indicated that preschool teachers working in eco preschools have more experience on implementing ESD than preschool teachers working in non-eco preschools, which might be expected since their opportunities at eco-schools, might differ and facilitate to run ESD practices. (Table 1).

Table 1. The Results of Descriptive Analyses

		Preschool Teachers (n)	
		Eco Preschools	Non-eco Preschools
Childhood location	Rural	280	412
	Urban	64	64
Household type at childhood	House	156	180
	Apartment	188	300
Membership to an NGO related to environmental, social and cultural issues	Yes	300	401
	No	48	89
Previous experiences on implementing ESD related activities	Yes	331	185
	No	17	305

Next, the level of knowledge about SD, attitudes towards SD, and ESD practices of all preschool teachers were examined. The results indicated similar levels of knowledge and attitudes for preschool teachers from both school types; on the other hand, mean score of ESD practices was 3.68 and 3.45 for teachers who were serving at eco and non-eco preschools, respectively, which indicates higher practice rates for eco-preschool teachers (Table 2).

Table 2. Preschool Teachers' Knowledge Level, Attitudes Towards SD, and ESD Practices

		Min.	Max.	M	SD	Variance
Knowledge about SD	in non-eco preschools	1.00	3.00	2.38	.37	.13
	in eco preschools	1.00	3.00	2.40	.39	.15
Attitude towards SD	in non-eco preschools	1.00	4.00	3.54	.38	.14
	in eco preschools	1.00	4.00	3.50	.35	.12
ESD Practice	in non-eco preschools	1.00	5.00	3.45	.56	.31
	in eco preschools	1.00	5.00	3.68	.66	.43

The Results of the Hierarchical Linear Modeling (HLM) Analyses

The sets of HLM models aimed to examine predictor effects of teachers' knowledge level of SD, attitude towards SD, childhood residence, household type at childhood, NGO membership, and previous ESD experiences in both eco and non-eco preschools. For the analyses, teachers' ESD practices were determined as outcome variable. HLM analyses were conducted under two sub-analyses, respectively, One-Way Random Effects ANOVA Model and Random Coefficient Model. One-Way Random Effects ANOVA was conducted to see the variability in teachers' ESD practices in both eco and non-eco preschools.

The data were analyzed based on the following regression equation:

Level-1 (Teacher-level) model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{KNOW}) + \beta_{2j}(\text{ATT}) + \beta_{3j}(\text{CHILD_R}) + \beta_{4j}(\text{CHILD_H}) + \beta_{5j}(\text{NGO_P}) + \beta_{6j}(\text{PRE_EX}) + r_{ij}$$

Level-2 (School-level) model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

In these models,

Y_{ij} is the outcome variable (Teachers' ESD practices)

β_{0j} is the mean on teachers' ESD practices for each preschool.

β_{1j} is the differentiating effect of teachers' knowledge about SD in preschool j.

β_{2j} is the differentiating effect of teachers' attitude towards SD in preschool j.

β_{3j} is the differentiating effect of teachers' childhood residence in preschool j.

β_{4j} is the differentiating effect of teachers' household type at childhood in preschool j.

β_{5j} is the differentiating effect of teachers' membership to a NGO in preschool j.

β_{6j} is the differentiating effect of teachers' previous experiences in preschool j.

γ_{00} is the average of preschools means on the outcome variable across the population of preschool.

r_{ij} is the level-1 residual.

u_{0j} = the unique increment to the intercept associated with preschool j.

The results indicated that 75.9% of total variability in teachers' ESD practices could be attributed to the preschools. The results revealed that the variance of the preschool level (τ_{00}) component was statistically significant. It means that there is a significant variability in teachers' ESD practices across non-eco preschools ($\tau_{00} = .07$, $X^2 = 144.94$, $df = 57$, $p < .001$). In the second analysis, the Random Coefficient Model was conducted to examine the explained variances in teachers' ESD practices as teacher-level predictor (Level-1) including preschool teachers' SD knowledge level, attitude towards SD, childhood residence, household type at childhood, NGO membership, and previous ESD experiences. It was conducted by addressing regression equations for each preschool, by computing averages of these preschools' intercepts-slopes with all variations. The results of the analysis showed that teachers' attitudes towards SD was determined as significantly and positively related predictor of ESD practices ($\gamma_{20} = .497$, $SE = .07$, $p < .01$). Furthermore, teachers previous experiences on ESD was found as another predictor of ESD practices ($\gamma_{60} = .145$, $SE = .06$, $p < .05$). Finally, the results of the study revealed that after the level-1 variables were added to the model as predictors of teachers' ESD practices, the residual variance was reduced by 9.6%.

Table 3. Final Estimation of Fixed Effects for Teachers' ESD Practices in Non-eco Preschools

Fixed Effects	Coefficient	SE	p
Teachers' ESD practices			
Intercept, γ_{00}	3.777	.25	.000***
KNOW, γ_{10}	.069	.07	.352
ATT, γ_{20}	.497	.07	.000***
CHILD_R, γ_{30}	.009	.08	.918
CHILD_H, γ_{40}	.050	.06	.417
NGO_P, γ_{50}	.136	.07	.060
PRE_EX, γ_{60}	.145	.06	.011*

* $p < .05$, ** $p < .01$, *** $p < .001$

KNOW: Knowledge about SD; ATT: Attitude towards SD; CHILD_R: Childhood Residence; CHILD_H: Childhood Household Type; NGO_P: Participation to a NGO; PRE_EX: Previous ESD Experience

HLM Analyses for Eco Preschools

In the second part of HLM analyses, all procedure were conducted for the eco-preschool data. The following regression equation models were tested in this part:

Level-1 (Teacher-level) model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{KNOW}) + \beta_{2j}(\text{ATT}) + \beta_{3j}(\text{CHILD_R}) + \beta_{4j}(\text{CHILD_H}) + \beta_{5j}(\text{NGO_P}) + \beta_{6j}(\text{PRE_EX}) + r_{ij}$$

Level-2 (School-level) model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

In these models,

Y_{ij} is the outcome variable (Teachers' ESD practices)

β_{0j} is the mean on teachers' ESD practices for each preschool.

β_{1j} is the differentiating effect of teachers' knowledge about SD in preschool j.

β_{2j} is the differentiating effect of teachers' attitude towards SD in preschool j.

β_{3j} is the differentiating effect of teachers' childhood residence in preschool j.

β_{4j} is the differentiating effect of teachers' household type at childhood SD in preschool j.

β_{5j} is the differentiating effect of teachers' membership to a NGO in preschool j.

β_{6j} is the differentiating effect of teachers' previous experiences in preschool j.

γ_{00} is the average of ECES means on the outcome variable across the population of preschool.

r_{ij} is the level-1 residual.

u_{0j} = the unique increment to the intercept associated with preschool j.

The results showed that 58.4 % of total variability in eco-preschool teachers' ESD practices could be attributed to differences of schools. The results also indicated that there is a significant variability in teachers ESD practices across eco preschools ($\tau_{00} = .02$, $X_2 = 78.17$, $df = 53$, $p < .001$). Then, the Random Coefficient Model was conducted to examine the explained variances in teacher's ESD practices as teacher-level predictor (Level 1) including preschool teachers' SD knowledge level, attitude towards SD, childhood residence, household type at childhood, NGO membership, and previous ESD experiences. This model was tested by referring regression equations for each school, by computing averages of these preschools' intercepts-slopes and all variations. The final model indicated that teachers' attitudes towards SD was in a significant and positive relationship with their ESD practices ($\gamma_{20} = .309$, $SE = .09$, $p < .001$). Moreover, teachers' membership to a NGO was found another predictor of their ESD practices ($\gamma_{50} = .216$, $SE = .08$, $p < .05$). Finally, the residual variance was reduced by 5.9% when the level-1 variables were added to the model as predictors of teachers' ESD practices.

Table 4. Final Estimation of Fixed Effects for Teachers' ESD Practices in Eco Preschools

Fixed Effects	Coefficient	SE	p
Teachers' ESD practices			
Intercept, γ_{00}	3.784	.27	.000***
KNOW, γ_{10}	.073	.08	.333
ATT, γ_{20}	.309	.09	.001**
CHILD_R, γ_{30}	.128	.08	.117
CHILD_H, γ_{40}	.052	.07	.426
NGO_P, γ_{50}	.216	.08	.011*
PRE_EX, γ_{60}	.041	.06	.494

* $p < .05$, ** $p < .01$, *** $p < .001$

KNOW : Knowledge about SD; ATT: Attitude towards SD; CHILD_R: Childhood Residence; CHILD_H: Childhood Household Type; NGO_P: Participation to a NGO; PRE_EX: Previous ESD Experience

Discussion and Conclusion

This research aimed to explore Turkish preschool teachers' Education for Sustainable Development (ESD) practices by considering predictor effects of their sustainable development (SD) knowledge level, attitude towards SD, childhood location, household type at childhood, membership to a NGO, previous ESD experiences in eco- and non-eco preschools.

When the level of their knowledge and attitudes were investigated, it can be understood that the teachers serving at either eco or non-eco preschool settings have higher levels of knowledge about and attitudes towards sustainable development. The significance of teachers' sustainable development knowledge and attitudes towards sustainable development might be emphasized since they are responsible for introducing sustainable development to the children (WCED, 1987). In this regard, their knowledge about and attitudes towards sustainable development can be described as a trigger to expand ESD in early childhood education (UNESCO, 2008). For the current study, as an expected result, preschool teachers serving at eco preschools were found as knowledgeable and they had positive attitudes towards SD since educators attending from eco settings enroll in professional development courses to encourage their understandings about ESD (FEE Eco-Schools, 2013). Besides, eco school program is one of the best practices promoting educators' competencies about sustainable development (UNESCO, 2011). Preschool teachers serving at non-eco preschools also had high levels of knowledge and attitude towards SD similar to their counterparts serving at eco settings. Interestingly, attitudes of preschool teachers serving at non-eco preschools were found higher than their companions from eco preschools. Although, this unexpected result implies a small difference, it may be related to many other factors affecting teacher attitudes in terms of gender, age, year of, experience on teaching, etc (Esa, 2010; Lahiri, 2011; Oerke & Bogner, 2010; Volk & Cheak, 2003). On the other hand, higher levels of knowledge

and attitudes of preschool teachers from both type of preschools can be connected to their increasing awareness about ESD because, from the beginning of 21st century, human face many challenges such as loss of biodiversity climate change, deforestation, decreasing energy resources, rapid urbanization, and diminishing fresh-water supplies which were caused by global economic development, industrialization and new technologies (Davis, 2010; UNESCO, 1992, 1997). Therefore, people have become more conscious about sustainable development and they would like to take initiative to seek solutions for those problems. Indeed, Hsu (2009) explained the underlying reasons of increasing environmental awareness in terms of natural experiences during childhood, environmental organizations, and loss of beloved places, and friends who encouraged them to join environmental organizations. When interpreting descriptive result, it can be also considered that most of the preschool teachers participating in this study, from either eco or non-eco preschools, grew up in rural areas and supported an NGO. In this regard, higher levels of teachers' knowledge and attitudes might also be related with their significant life experiences in terms of growing up in rural areas and having NGO membership.

When it comes to comparison of ESD practices of the preschool teachers across eco versus non-eco preschools, it was committed that preschool teachers from eco-preschools implement more practices than their counterparts from non-eco ones. In other words, the preschool teachers serving in eco preschools practice ESD-related educational activities more than their counterparts from non-eco preschools. Eco-schools are regarded as a good model which represents whole school approach providing a variety of prospects to encourage ESD in educational settings (Scott, 2011). UNESCO (2009) also regarded eco-schools program as one of the best educational model supporting ESD and for a sustainable future. On the other hand, despite the appropriate bases of the national curriculum for embedding ESD practices, preschool teachers serving at non-eco preschools had lower levels of practices. This result is expected; yet, after providing necessary conditions, it is well known that preschool teachers serving at non-eco preschools can enlarge their ESD practices (Kahrیمان Pamuk & Olgan, 2018).

HLM analyses were conducted to compare possible predictors of preschool teachers' Education for Sustainable Development (ESD) practices across eco versus non-eco preschools. According to results, preschool teachers' ESD practices serving at eco and non-eco preschools was significantly and positively related with their attitudes towards SD. It means that holding higher levels of attitudes result in more ESD practices regardless of school type. This indicates that when preschool teachers' attitudes towards SD become more positive, so they can have more roles in practicing ESD related preschool activities. These findings are expected as environmental education research, and partially highlighted that there is a relationship between attitudes towards SD and ESD practice (Hines et al., 1987; Thompson & Barton, 1994). In other words, attitudes towards sustainable development are one of the most important factors influencing ESD practices. Thus, preschool teachers adopting positive attitudes towards SD tended to have ESD practices in their schools. However, positive attitudes do not always turn into appropriate practices. Both pre- and in-service preschool teachers may be supported with professional development courses in terms of workshops etc. to promote both theory and practice of ESD (Dyment et al., 2014). As studied in the field of educational science (Supovitz, Mayer, & Kahle, 2000) attitudes of teachers may be encouraged by participating in these professional development courses.

On the other hand, sustainable development knowledge of preschool teachers did not relate with their practices regardless of the setting type they work at. The relevant literature claims a contradiction about the relationship between knowledge and practices regarding environmental issues. A variety of studies conducted in the environmental education research area reported an indirect relationship between knowledge and practice (Barr, 2003; Hsu & Roth, 1999). As well as, Hwang, Kim, and Jeng (2000) and Boubonari, Markos, and Kevrekidis (2013) reported that knowledge is not a predictor of practice. Contrary, Hungerford and Volk (1990) proposed a linear relationship between environmental knowledge, attitude and behavior. In the current study, a non-significant connection

between knowledge and practice is found. In this regard, Schultz (2002) highlighted that knowledge may not be a direct variable which determines environmental practices; however, it may be a facilitator among environmental attitudes and environmental practices. In conclusion, the results pointed out that ESD practices were associated with their SD attitudes but not with their SD knowledge for the both school type as inferred by relevant literature.

When investigating predictor role of childhood location and household type on preschool teachers' ESD practices, regardless of the school type they work at, the preschool teachers' ESD practices cannot be associated with the location and the household type they grew up. On the behalf of ESD practices of preschool teachers, living rural or urban and apartment or house during childhood did not indicate a significant difference. Unexpectedly, these findings conflict with the relevant literature. Referring the environmental education research, especially underlined by Palmer (1998), Sward (1999), and Chawla (1999), location and household type in childhood, in fact, childhood natural experiences could be predictors of ESD practices. It was assumed in the current study that preschool teachers rising up in rural rather than urban and living at house rather than apartment tend to have more connection with nature as well as social- cultural and economic issues. This unexpected result may be explained by report of Palmer (1995). Palmer's (1995) cross-cultural study about background variables and environmental actions, which was conducted with a large sample from many countries, emphasized that social, cultural and economic circumstances of different countries might be the reason of contradiction among research results. Palmer also (1995) added that sampling issues might also result in conflicts from one country to the next. In conclusion, the current study revealed non-significance of childhood location and household type on ESD practices of preschool teachers serving at both eco and non-eco preschools. Considering the age of the teachers, the social, cultural and economic conditions in urban and rural areas during their childhood were not as different as today. The cities were also still full of green fields and empty lands. However, it can be paid attention to Tanner (1998) stating "if we find that certain kinds of early experiences were important in shaping adults, perhaps environmental educators can, to the degree feasible, replicate those experiences in the education of the young" (1998, p. 399). In other words, despite the contradiction between the existing research and the current study, young children may be provided opportunities to spend time in nature especially by preschool teachers even though this implication is beyond the scope of the current study.

Afterwards, NGO membership was found as a predictor of preschool teachers' ESD practices whom are only attending from eco settings. On the other hand, ESD practices of their counterparts serving at non-eco preschools were not significantly predicted by being a member of NGO. The notion is that NGO connection motives ESD practices for the preschool teachers serving at eco settings as also concluded by the relevant literature. Pe'er et al. (2007) similarly highlighted that NGO membership prompts pre-service teachers to involve in environmental, economic and socio-cultural issues more than others. Likewise, Goldman et al. (2006) reported a significant relationship between engagement in NGOs and acting for environment. The underlying reason could be related about the circumstances in this setting type. Eco preschools are more appropriate for reflecting this kind of ideas to ESD practices. In other words, educators serving at eco preschools have experiences about environmental, economic, and socio-cultural issues in their settings more than their counterparts from non-eco settings. In addition, eco schools may have connections with a variety of NGOs, and may benefit from their experiences when comparing non-eco schools (FEE Eco-Schools, 2013). As stated by the Millennium Developmental Goals (United Nations, 2014), NGOs are one of the best establishments to indorse innovative way of teaching in education. In this respect, NGO stakeholders might pay attention to effort in the field of ESD so as to contribute for a sustainable life. Accordingly, the results of the current study, emphasizing significance of NGOs for a sustainable life, may also inspire the preschool teacher's ESD practices as addressed in the Millennium Development Goals (United Nations, 2014).

As the outcome of this research revealed, the preschool teachers serving at non-eco preschools conducted more ESD practices if they had past teaching experiences related to Education for Sustainable Development (ESD). On the other hand, past ESD experiences did not seem to predict preschool

teachers' ESD practices who are attending from eco-settings. When the related research is inspected, it was indicated that previous teaching experiences might be related to later teaching experiences. Moreover, Rajecki (1982) commented that direct experiences could also be associated with later practices. The underlying motive explaining the non-significant relationship between ESD practices of preschool teachers' serving at eco-schools and their previous experiences may be illuminated that preschool teachers attending from eco preschools, have already had ESD practices as eco school program requires. Learning environment, curriculum resources, daily routines and the activities in eco-preschools can customarily also be related with ESD content. Conversely, the preschool teachers from non-eco settings do not have any commitment to include ESD practices in the curriculum like their colleagues. In other words, if preschool teachers from non-eco settings are concerned with ESD, they can plan and conduct ESD practices regardless of the setting type. Therefore, past experiences of ESD practice may be a significant predictor of ESD practices for the teachers from non-eco preschools.

In view of the points argued earlier, social politicians, curriculum developers, researchers and early childhood education educators might pay attention to findings of the current study. It is clear that there has been a growing interest in Education for Sustainable Development (ESD) in early childhood education (ECE). This research makes an effort to compare ESD practice of preschool teachers across eco versus non-eco preschools. Indeed, predictors of preschool teachers' ESD practices serving at two unlike type of preschools were investigated. Since the embedding issues of sustainable development into curriculums is considered as the foremost objective of ESD, educators for the construction of ESD practice might consider these variables. Indeed, attitude is the only common significant predictor of ESD practices for preschool teachers serving at either eco or non-eco settings. In this esteem, the underlying variables motivating attitudes might be considered for the further research (OECD, 2005). In addition, considering the relationship between NGO membership and ESD practices, preschool teachers may be encouraged to interest in issues of sustainable development (UNESCO, 2005). With this understanding, previous experiences might be considered for the ones who have never implemented ESD practices. As Tanner (1980) and Chawla (1999) reported, personal and previous experiences with environmental, socio cultural and economic issues throughout life may influence ESD practices.

Considering the discussion above, some limitations about this study should also be added. Initially, it may be taken into consideration that ESD is a new paradigm in early childhood education research; therefore, some limitations are embedded within the theoretical framework. This study is also limited with 111 ECEs and 838 ECEEs in four of Turkey's metropolitan cities. Accordingly, a nationwide study might be considered to generalize the relationships between the associated variables. On the other hand, demographic variables and social- cultural and economic backgrounds of participants were not deeply investigated. The other limitation is methodology of this study. The comparative nature of the data may be considered as a limitation since it raises questions about the causal links between variables. Finally, findings of the current study depended on self-reported data of participants despite the precautions to promote honest responses.

Despite these limitations, the current study captures a good starting point for the inclusion of Education for Sustainable Development (ESD) into early childhood education (ECE) curriculum on the behalf of preschool teachers in Turkey. Since the reorientation of education towards sustainable development is considered as the ultimate outcome of the ESD (Kopnina, 2012), and the teachers are perceived as the most significant human resource for indorsing ESD by UNESCO (2007), these variables can be taken into consideration by educators and stakeholders as guides for embedding ESD into educational process starting from early years. Although there is a growing interest in research on ESD theory and practice (UNESCO, 2012), further studies needed to be continued to work on, discover and investigate issues of ESD.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
- Aktepe, S., & Girgin, S. (2009). İlköğretimde eko-okullar ve klasik okulların çevre eğitimi açısından karşılaştırılması. *İlköğretim Online*, 8(2) 401-414.
- Alelaimat, A. R., & Taha, K. (2013). Sustainable development and values education in the Jordanian. *Social Studied Curriculum*, 134(2), 135-153.
- Alıcı, S. (2013). *The effects of creative drama on preschool's children environmental awareness* (Unpublished master's thesis). Middle East Technical University, Ankara.
- Bajd, B., & Leščanec, T. (2011). The influence of the eco-school and healthy school projects on environmentally responsible behavior of primary school pupils. *Education and Health Care*, 21, 79-85.
- Barr, S. (2003). Strategies for sustainability: Citizens and responsible environmental behaviour. *Area*, 35(3), 227-240.
- Bentler, P. M., & Speckart, G. (1979). Models of attitude-behavior relations. *Psychological Review*, 86(5), 452.
- Biasutti, M., & Frate, S. (2017). A validity and reliability study of the attitudes toward sustainable development scale. *Environmental Education Research*, 23(2), 214-230.
- Boubonari, T., Markos, A., & Kevrekidis, T. (2013). Greek pre-service teachers' knowledge, attitudes, and environmental behavior toward marine pollution. *The Journal of Environmental Education*, 44(4), 232-251.
- Boutte, G. S. (2008). Beyond the illusion of diversity: How early childhood teachers can promote social justice. *The Social Studies*, 99(4), 165-173.
- Bursjö, I. (2011). How student teachers form their educational practice in relation to sustainable development. *Utbildning & Demokrati*, 20(1), 59-78.
- Cengizoğlu, S. (2013). *Education for sustainability: Exploring changes on young children's perception toward environmental problems* (Unpublished master's thesis). Middle East Technical University, Ankara.
- Chawla, L. (1999). Life paths into effective environmental action. *The Journal of Environmental Education*, 31(1), 15-26.
- Davis, J. M. (2010). Early childhood education for sustainability: Why it matters, what it is, and how whole centre action research and systems thinking can help. *Journal of Action Research Today in Early Childhood*, Special Issue, 35-44.
- Didonet, V. (2008). Early childhood education for a sustainable society. In I. Samuelsson & Y. Kaga (Eds.), *The contribution of early childhood education to a sustainable society* (pp. 25-30). Paris: UNESCO.
- Duerden, M. D., & Witt, P. A. (2010). The impact of direct and indirect experiences on the development of environmental knowledge, attitudes, and behavior. *Journal of Environmental Psychology*, 30(4), 379-392.
- Duncan, E. (2011). *Report part 2 – ESD in practice*. Norway: OMEP (Organisation Mondiale Pour L'Éducation Préscolaire).
- Dyment, J. E., Davis, J. M., Nailon, D., Emery, S., Getenet, S., McCrea, N., ... & Hill, A. (2014). The impact of professional development on early childhood educators' confidence, understanding and knowledge of education for sustainability. *Environmental Education Research*, 20(5), 660-679.
- Esa, N. (2010). Environmental knowledge, attitude and practices of student teachers. *International Research in Geographical and Environmental Education*, 19(1), 39-50.
- FEE Eco-Schools. (2013). What is eco-schools? Eco-school programme. Retrieved from <http://www.eco-schools.org/menu/about/eco-schools-2>

- FEE Eco-Schools. (2015). Green Key. Retrieved from <https://www.fee.global/green-key-1>
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research reading*. MA: Addison-Wesley.
- Flogaitis, E., & Agelidou, E. (2003). Kindergarten teachers' conceptions about nature and the environment. *Environmental Education Research, 9*(4), 461-478.
- Fredricks, A. J., & Dossett, D. L. (1983). Attitude-behavior relations: A comparison of the Fishbein-Ajzen and the Bentler-Speckart models. *Journal of Personality and Social Psychology, 45*, 501-512.
- Goldman, D., Yavetz, B., & Pe'er, S. (2006). Environmental literacy in teacher training in Israel: Environmental behavior of new students. *The Journal of Environmental Education, 38*(1), 3-22.
- Green, S. S. (2013). *Preschool teachers' early perceptions of education for sustainable development in early childhood education* (Unpublished master's thesis). Southern Illinois University, Carbondale.
- Hallfreðsdóttir, S. (2011). *Eco schools-are they really better?* (Unpublished doctoral dissertation). Lund University, Sweden.
- Henderson, K., & Tilbury, D. (2004). *Whole-school approaches to sustainability: An international review of sustainable school programs*. Australian Research Institute in Education for Sustainability (ARIES) for The Department of the Environment and Heritage, Australian Government. Retrieved from <https://promiseofplace.org/sites/default/files/2018-06/international%20review%20of%20whole%20school%20sust.%20progs.pdf>
- Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible pro-environmental behavior: A meta-analysis. *The Journal of Environmental Education, 18*(2), 1-8.
- Hsu, S. J. (2009). Significant life experiences affect environmental action: A confirmation study in eastern Taiwan. *Environmental Education Research, 15*(4), 497-517.
- Hsu, S. J., & Roth, R. E. (1999). Predicting Taiwanese secondary teachers' responsible environmental behavior through environmental literacy variables. *The Journal of Environmental Education, 30*(4), 11-18.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.
- Huz, Ç., & Kalburan, N. (2017). Eko-okul olan ve olmayan anaokullarının bahçe özellikleri ile öğretmenlerin bahçe özellikleri ve kullanımına ilişkin görüşleri. *İlköğretim Online, 16*(4), 1600-1620.
- Hwang, Y. H., Kim, S. I., & Jeng, J. M. (2000). Examining the causal relationships among selected antecedents of responsible environmental behavior. *The Journal of Environmental Education, 31*(4), 19-25.
- Kahrman, D., & Güler-Yıldız, T. (2017). Erken çocukluk döneminde sürdürülebilir gelişim için eğitim. In B. Akman, G. Uyanık Balat, & T. Güler Yıldız (Eds.), *Erken çocukluk döneminde fen eğitimi* (pp. 247-266). Ankara: Anı Yayıncılık.
- Kahrman Öztürk, D., Olgan, R., & Güler, T. (2012). Preschool children's ideas on sustainable development: How preschool children perceive three pillars of sustainability with the regard to 7R. *Educational Sciences: Theory & Practice, 12*(4), 2987-2995.
- Kahrman Pamuk, D., & Olgan, R. (2018). Teacher practices and preschool physical environment for education for sustainable development: Eco vs. ordinary preschools. *Mersin University Journal of the Faculty of Education, 14*(2), 669-683.
- Kopnina, H. (2012). Education for sustainable development (ESD): The turn away from 'environment' in environmental education?. *Environmental Education Research, 18*(5), 699-717.
- Korkmaz, A., & Güler-Yıldız, T. (2017). Assessing preschools using the eco-schools program in terms of educating for sustainable development in early childhood education. *European Early Childhood Education Research Journal, 4*, 1-17.

- Krajhanzl, J. (2010). Environmental and proenvironmental behavior. *School and Health, 21*(1), 251-274.
- Krnel, D., & Naglic, S. (2009). Environmental literacy comparison between eco-schools and ordinary schools in Slovenia. *Science Education International, 20*, 5-24.
- Lahiri, S. (2011). Assessing the environmental attitude among pupil teachers in relation to responsible environmental behavior: A leap towards sustainable development. *Journal of Social Sciences, 7*(1), 33-41.
- Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing, 18*, 503-520.
- Ministry of Education. (2013). *Okul öncesi eğitim programı*. Ankara: MEB.
- OECD. (2005). *The definition and selection of key competencies (DeSeCo)*. Retrieved from <http://www.oecd.org/pisa/35070367.pdf>
- Oerke, B., & Bogner, F. X. (2010). Gender, age and subject matter: Impact on teachers' ecological values. *Environmentalist, 30*, 111-122.
- Pajares, M. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research, 62*(3), 307-332.
- Palmer, J. A. (1995). Environmental thinking in the early years: Understanding and misunderstanding of concepts related to waste management. *Environmental Education Research, 1*(1), 35-45.
- Palmer, J. A., & Suggate J. (1996). Influences and experiences affecting the proenvironmental behavior of educators. *Environmental Education Research, 2*(1), 109-121.
- Palmer, M. (1998). Environmental regulation in the people's Republic of China: The face of domestic law. *The China Quarterly, 156*, 788-808.
- Park, E., Kim, H., & Yu, S. (2015). *The perception and attitude of in-service teachers in early childhood education toward Education for Sustainable Development (ESD) in Korea: Early childhood pathways to sustainability*. Paper presented at 67th OMEP World Assembly and International Conference, Washington DC, U.S.A.
- Peck, R. F., & Tucker, J. A. (1973). Research on teacher education. In R. M. Travers (Ed.), *Second handbook of research on teaching*. Chicago: Rand McNally.
- Pe'er, S., Goldman, D., & Yavetz, B. (2007). Environmental literacy in teacher training: Attitudes, knowledge, and environmental behavior of beginning students. *The Journal of Environmental Education, 39*(1), 45-59.
- Pröpsting, S., Štroffeková, E., Hollmann, H., & Crost, H. (2010). *Guideline to support for pupils' participation in eco-schools*. Retrieved from http://www.umwelterziehung.de/projekte/Slowakei_Projekt/LEITFADEN_TEXTVERSION_End_Engl.Neu.pdf
- Rajecki, D. W. (1982). *Attitudes: Themes and advances*. Massachusetts: Sinauer Associates Inc.
- Samuelsson, I. P. (2011). Why we should begin early with ESD: The role of early childhood education. *International Journal of Early Childhood, 43*(2), 103.
- Scott, W. (2011). Sustainable schools and the exercising of responsible citizenship-a review essay. *Environmental Education Research, 17*(3), 409-423.
- Schultz, P. (2002). Environmental attitudes and behaviors across cultures. *Online Readings in Psychology and Culture, 8*(1), 4.
- Siraj-Blatchford, J., & Pramling-Samuelsson, I. (2016). Education for sustainable development in early childhood care and education: An introduction. *International Research on Education for Sustainable Development in Early Childhood, 1-15*.
- Supovitz, J. A., Mayer, D. P., & Kahle, J. B. (2000). Promoting inquiry-based instructional practice: The longitudinal impact of professional development in the context of systemic reform. *Educational Policy, 14*(3), 331-356.

- Sward, L. L. (1999). Significant life experiences affecting the environmental sensitivity of El Salvadoran environmental professionals. *Environmental Education Research*, 5(2), 201-206.
- Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *The Journal of Environmental Education*, 11(4), 20-24.
- Tanner, T. (1998). Choosing the right subjects in significant life experiences research. *Environmental Education Research*, 4(4), 399-417.
- Thompson, S. C. G., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes towards the environment. *Journal of Environmental Psychology*, 14(2), 149-157.
- UNESCO. (1976). *Belgrade charter*. Paris
- UNESCO. (1992). *Agenda 21. "Promoting Education, Public Awareness and Training (Chapter 36)." Report of the United Nations Conference on Environment and Development*. Rio de Janeiro.
- UNESCO. (1997). *Educating for a sustainable future: A trans-disciplinary vision for concerted action*. Retrieved from http://www.unesco.org/education/tlsf/mods/theme_a/popups/mod01t05s01.html
- UNESCO. (2003). *Framework for a draft international implementation scheme for the united nations decade of education for sustainable development (Jan 2004 - Dec 2014)*. Paris.
- UNESCO. (2005). *United nations decade of education for sustainable development 2005-2014: International implementation scheme draft*. Retrieved from <http://unesdoc.unesco.org/images/0013/001399/139937e.pdf>
- UNESCO. (2007). *The UN decade of education for sustainable development: The first two years*. Paris: UNESCO.
- UNESCO. (2008). *The Gothenburg recommendations*. Retrieved from <http://www.desd.org/Gothenburg/Recommendations.pdf>
- UNESCO. (2009). *World conference on education for sustainable development and the bonn declaration*. Paris: UNESCO.
- UNESCO. (2011). *National journeys towards education for sustainable development*. Paris: UNESCO.
- UNESCO. (2012). *United nations decade of education for sustainable development: Rio+20 (2005-2014)*. Retrieved from <http://www.uncsd2012.org/content/documents/492UNESCO%20Input%20to%20Rio0%20Compilation%20Document.pdf>
- United Nations. (2014). *The millennium development goals report 2014*. New York: United Nations. Retrieved from <http://www.un.org/millenniumgoals/2014%20MDG%20report/MDG%202014%20English%20web.pdf>
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. A/RES/70/1.
- United Nations Conference on Environment and Development. (1992). *Agenda 21: Action plan for the next century*. Rio de Janeiro.
- Volk, T. L., & Cheak, M. J. (2003). The effects on an environmental education program on students, parents and community. *The Journal of Environmental Education*, 34(4), 12-25.
- World Commission on Environment and Development. (1987). *Our common future*. Oxford: Oxford University Press.
- Wray-Lake, L., Flanagan, C. A., & Osgood, D. W. (2010). Examining trends in adolescent environmental attitudes, beliefs, and behaviors across three decades. *Environment and Behavior*, 42(1), 61-85.
- Zimbardo, P., Ebbesen, E., & Maslach, C. (1977). *Influencing attitudes and changing behavior*. Reading, MA: Addison Wesley Publishing Company.