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The Effects of Ecology-Based Summer Nature Education Program on Primary School Students' Environmental Knowledge, Environmental Affect and Responsible Environmental Behavior

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Abstract

The purpose of the study was to assess the effects of ecology-based nature education program on elementary school students' environmental knowledge, environmental affect, and responsible environmental behavior. A total number of 64 elementary school students including 26 females and 38 males who participated in summer natural education organized in Ankara in 2008 and supported by TUBITAK was the sample of this study which was designed as pretest- posttest experimental study. A series of data collection instruments was administrated to the sample at the beginning and at the end to assess students' knowledge, affect, and behavior regarding to environment. Qualitative data were subjected to content analysis whereas quantitative data were analyzed using repeated measures of ANCOVA and t-test. This study showed that ecology-based nature education program contributed significantly to children's responsible environmental behavior. Although students' posttest environmental knowledge and affect scores were higher than those of pretest scores, no significant effect of nature education program on environmental knowledge and affect were observed.

Key Words

Nature Education, Knowledge, Affective Tendencies and Behavior.

The history of nature studies goes back to 1890s (McCrea, 2006) and of nature education to 1920s (Ford, 1986). The movement of Conservation Education, Outdoor Education, Environmental Education and Education for Sustainable Development follows these initial studies (Marcinkowski, 2010). However, Nature Education, the focus of the present study, has recently become more popular in the field of education in Turkey.

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Even if nature education and environmental education are used interchangeably by many researchers, they are slightly different from one another. Nature education means giving meaning to organism and goes beyond to give meaning to nature as a whole. Nature education help develop environmental awareness, sense of responsibility, environmental knowledge, affect, and thus responsible behavior (Erdoğan & Özsoy, 2007; Matthews & Riley, 1995; Yerkes & Haras, 1997). On the other hand, the ultimate outcomes of environmental education are to develop environmentally literate individuals (Harvey, 1977) and responsible environmental behaviors of the individuals (Hungerford & Volk, 1990). Furthermore, environmental education help to develop understanding the relationship between man and his biophysical environment (International Union for Conservation of Nature [IUCN], 1972; Roth, 1970). For maximum success on the development of environmental knowledge, affect, and responsible behavior, children in early ages should

be taken to the natural environment and have them get involved in outdoor activities (Doğan, 1997; Gökler & Yılmaz, 1999; Russo, 2001)

Nature education studies have been coordinated by TUBITAK (National Scientific Research Organization) since 1999 for mainly teachers and graduates (Ozaner, 2004). More recently, natural science and applied science camps and programs have been started for elementary school and high school students (see www.tubitak.gov.tr). Furthermore, Ministry of Environment and some environmental Non-Governmental Organizations have organized such activities for the students; such as, Doğa Çantam (Nature Bag), Genç Ekologlar Çevre Eğitim Programı (Youth Ecologist Environmental Education Program) and Yeşil Kutu (Green Pack).

The research studies on outdoor and nature education have been undertaken for several years (Bogner, 1998, 2002; Dresner & Gill, 1994; Hazelworth & Wilson, 1990; Kruse & Card, 2004; Lisowski & Disinger, 1991; Palmerg & Kuru, 2000). On the other hand, this area of investigation has recently become the focus of the research area in Turkey. Some of these studies were undertaken with teachers, university students and graduates (Erdoğan & Özsoy, 2007; Güler, 2009; Keleş, Uzun & Uzun, 2010; Köksal, Erdoğan, Aydemir, & Armağan, 2010) and elementary school students (Erdoğan & Erentay, 2007; Erdogan, Erentay, Barss, & Nechita, 2008; Erentay & Erdoğan, 2006; Özdemir, 2010) who participated in either nature education programs or other outdoor activities (i.e. visiting lake ecosystem). The results of these students pointed out that students' gain on knowledge, attitude and behavior regarding the environment improved as a results of nature and outdoor activities. Due to the limited number of the studies and findings, more research studies are needed to determine the long term effects of nature and outdoor activities on students' cognitive, affective, and psychomotor attainments. In addition, more explicit data are needed to clearly present the effects of these activities. In this sense, this study addressed to the following research questions;

1. Does ecology-based nature education program significantly contribute to the development of environmental knowledge?
2. Does ecology-based nature education program significantly contribute to the development of environmental affect?
3. Does ecology-based nature education program significantly contribute to the development of responsible environmental behavior?

Method

This pre-test post-test without control group design was undertaken with 64 elementary school students including 26 females and 38 males who participated in ecology-based nature education program supported by TUBITAK in 2008-2009. The students' ages ranged 8 to 13 and their age average was 10.91 (Sd = 1.109).

Three data collection instruments were used to gather data from the participants. Students' knowledge on selected ecological and environmental concepts were assessed through making use of Natural Sciences Knowledge Test (Doğa Bilimleri Testi) consisting of 15 multiple choice items with four options. KR21 reliability of the test was .69. Affective Disposition Scale (Duyuşsal Eğilimler Ölçeği) developed by Erdoğan (2009) was used to assess students' environmental affect. This scale includes three dimensions as "willingness to act" (5 items, Cronbach's alpha = .83), "Environmental Attitude" (5 items, Cronbach's alpha = .68) and "Environmental Sensitivity" (4 items Cronbach's alpha = .71). This scale includes 14 items on a four point Likert type items (agree – disagree). In order to examine how frequently the students demonstrate certain behavior to protect the environment, Active Participation in Environmental Protection Questionnaire (Çevrenin Korunmasına Aktif Katılma Anketi) developed by the author based on the review of literature (Alp, Ertepınar, Tekkaya, & Yılmaz, 2008; Erdoğan, 2009; Hines, Hungerford, & Tomera, 1986/87; Leeming, Dwyer, & Bracken, 1995). Consisted of 12 items with three alternatives, the Cronbach's alpha reliability coefficient of the questionnaire was .77.

The instruments were administrated to the students at the beginning and at the end of the summer nature education program lasted 12 days. Students' gain on knowledge, affect, and behavior were assessed with paired t-test at significant level of .05.

Results

Before they were involved in summer nature education program, the students obtained environmental related information from TV (n=51, %=97.7), environmental related books (n=45, %=70.3), school (n=44, %=68.8), internet (n=43, %67.2), newspaper and magazines (n=39, % 60.9), environment clubs (n=34, %=53.1), and their own observations (n=32, %=50). Most of the students (n=52) reported that any of their family members (father, mother, sibling) showed environmental

Table 1
Paired T-Test Scores and Pretest Posttest Comparisons

Dimensions	Test	n*	Min-Max	Average	*SS*	ANCOVA / t test
Environmental knowledge	Pretest	61	4-14	9.8	2.83	Wilks's Λ= .96, F (1, 59) = 2,45*
	Posttest	61	6-15	10.62	2.36	
Willingness to act	Pretest	54	5-20	17.48	3.34	-1.56*
	Posttest	54		18.05	2.64	
Environmental Attitudes	Pretest	55	5-20	19.63	.94	.41*
	Posttest	55		19.56	1.10	
Environmental Sensitivity	Pretest	55	4-16	13.16	2.97	-1.32*
	Posttest	55		13.60	2.38	
Responsible Environmental Behavior	Pretest	53	21-36	29.42	3.93	-3.33**, η^2 = .17
	Posttest	53	23-36	30.70	4.20	

* p>.05, ** p<.01

concern. As presented in Table 1, statistical significant was observed between pretest and posttest scores for students' responsible behavior [t (52) = -3.33, p<0.01, eta squared = 0.17], not for environmental knowledge [Wilks's Λ= .96, F (1, 59) = 2,45, p =.123], willingness to act [t (53) = -1.56, p>0.05], environmental attitude [t (54) = .41, p>0.05] and environmental sensitivity [t (54) = -1.32, p>0.05].

Students' responses to each "Why" questions asked after each affect items revealed that they held mostly eco-centric concepts and rarely ego-centric conceptions.

Discussion

This study revealed that ecology-based summer nature education program contributed significantly to the development responsible environmental behavior (eta squared = .17). This effect size refers that nature education program had high level impact on students' behavior regarding the environment. However, the effects of ecology-based summer nature education program on students' environmental knowledge and environmental affect were not observed to be significant.

Participating in outdoor and out-of school activities help the individuals observe the cause – effect relationship occurring in the natural environment (Yerkes & Haras, 1997). Several studies conducted with high school students (Lisowski & Disinger, 1991) and elementary school students (Erdoğan & Erentay, 2007; Erdoğan et al., 2008; Erdoğan, Erentay, Aydogan, Çelik, Çınar, Balaban, et al. 2010; Martin, 2003) indicated that involvement in outdoor activities provided students with a deeper understanding of naturel environment and developed their own environmental knowledge. In this regard, Heather (1999) and Bogner (1998) asserted that outdoor activities provide hands-on activities which enable the students to integrate theory and practice, and to attain cognitive attainments.

Even if there was no significant difference observed between pre and post-test scores, students' gain scores regarding environmental affect improved to certain degree after a 12 days nature education program. Students' pre and post test scores were observed to be a slightly lower than the maximum total score to be obtained from the scale. This result is quite consistent with many research studies reporting high level of environmental affect for children (Erdoğan, 2009; Erdoğan, Marcinkowsk, & Ok, 2009). Based on their research study with high school students, Connell, Fien, Lee, Sykes and Yenchen (1999) found out that when the age decreased, students' environmental attitude was increased. In another study with the students in 12th grade showed that nature-based environmental activities improved students' environmental attitudes, but this effect was no statistically significant (Gillet, Thomas, Skok, & McLaughlin, 1991). Bonnett and Williams (1988) reported that younger students showed high level emphaty toward and had more attachment to the environment which resulted in positive affect toward the environment. In their review of the literature, Crompton and Sellar (1981) reported that camp and outdoor activities had potential impact on students' affective development.

Students' gain score on behavior item from posttest were significantly higher than that from pretest. This refers that ecology based nature education program significantly contributed to the de-

velopment of responsible environmental behavior. This result is in line with the findings reported earlier. Özdemir (2010), Kruse and Card (2004) and Erdoğan and Erentay (2007) reported students' improved responsible environmental behavior as a results of outdoor and nature-related activities. Furthermore, nature related and outdoor activities enhance students' sense of responsibility (Erdoğan & Özsoy, 2007; Yerkes & Harras, 1997) which later turn into responsible environmental behavior (Hines, Hungerford & Tomera, 1986/87; Palmerg & Kuru, 2000). Also, involvement of nature activities increase students' awareness of the dimensions of the environment (Howe & Disinger, 1998) and help develop environmental values (Leeming, Dwyer, Porter, & Cobern, 1993). Dresner and Gill (1994) claimed that the ones who know how to act on the protection of the environment tend to take active role in environmental protection.

Outdoors and schoolyards are one of the best places which stimulate students' gain on various aspects of learning (cognitive, affective and psychomotor) (Carrier, 2009). These places can be considered as open space laboratories which help integrate theory into practice. Since nature related activities are interdisciplinary in nature, the students who are involved in these activities have more opportunity to observe the relationship among various disciplines. The students can also observe how theoretical knowledge can implemented into the practice. Taking the advantages of outdoor activities into account, these activities can be integrated into the course curriculum and organized as extracurricular activities.

Ecology-based nature education programs have been organized and supported by TUBITAK for several years. The number of these programs should be increased so that large number of students can also have a chance to be involved in these programs which are assumed to be supplementary to the formal curriculum (Erdoğan & Uşak, 2009).

This study was designed as pretest posttest without control group study since only the students who were involved in the summer education program were considered as the participants. Further research is needed with control group in order to see the comparable effects on the selected variables. Furthermore, in future research, outdoor activities should be considered as an integral part of the curriculum and an experimental research is needed outdoor activities versus in class activities.

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