



http://www.eab.org.tr

Available online at:

http://www.eab.org.tr/public/ijer/3/1/sukran_yalcin_ozdilek.pdf



http://ijer.eab.org.tr

Educational Research Association
The International Journal of
Educational Researchers 2011, 3 (1) : 33-45
ISSN: 1308-9501

COMMUNITY AND NATURE AS CURRICULUM: A CASE STUDY OF AN OUTDOOR ENVIRONMENTAL EDUCATION PROJECT*

Şükran YALÇIN ÖZDİLEK **, Hasan Göksel ÖZDİLEK ***,
Emel OKUR****, Mustafa Yunus Eryaman*****

Abstract: Improvement of awareness and positive attitudes towards the environment is certainly challenging, but not impossible. Programs specifically designed towards the raising of environmental awareness are called for in tackling such challenges. This paper describes the concept, content and application of an outdoor environmental education project that is implemented mostly in nature and supported by TUBITAK (The Scientific and Technological Research Council of Turkey) in 2008 and 2009. The program for the project was prepared by taking into consideration basic principles of ecology and experimental design. Training activities forming the project were carried out in and around various districts (counties) in the province of Canakkale namely; Can, Ezine, Bayramic, Eceabat and Bozcaada. Canakkale's natural features (flora, fauna, geology, geomorphology), and anthropogenic, social and cultural richness were used as examples. The education was conducted interactively. In keeping with the aim and scope of the project, participants were introduced to and made aware of the need for conservation in these fields. Additionally, it was intended that ecological knowledge would be gained and absorbed by the target group which would result in increased environmental awareness. Activities were intended to be practical rather than theoretical and performed completely in the field. All participants actively joined in the activities. The project activities included qualitative as well as quantitative observation, problem-based tasks, along with brain storming within a learner-centered free-thinking atmosphere, with the aim of achieving an idea-yielding, capacity-building, synthetic application – considered to be the most advanced level of the learning process. The knowledge gained was therefore expected to be used by participants in their future lives. During the activities, the ecological point of view was adopted, yet human-centered environmental awareness was also explained wherever necessary. One of the positive feedbacks of this project was some participants' contacting of their trainers in order to get additional information on a particular subject after the conclusion of the field applications. One of the negative outputs of this project was the reproach of participants concerning difficulties in remembering their learning due to the intensity of the program. The result of this project is expected to be applied over a larger area with a corresponding training program aimed at contributing towards the protection of nature.

Keywords: *outdoor education, environmental education, design experiment, ecology*

* A part of this article had been presented in the conference, "The Future of Ecocriticism: New Horizons." jointly organized by Hacettepe and Ankara Universities, was held at Limak Limra Hotel from November 4-6, 2009 in Kemer-Antalya, Turkey.

** Department of Biology, Science and Letters Faculty, Çanakkale Onsekiz Mart University Terzioğlu Campus 17100 Çanakkale TURKEY E-mail: syalcinozdilek@gmail.com

*** Department of Environmental Engineering, Faculty of Engineering and Architecture, Çanakkale Onsekiz Mart University, Terzioğlu Campus 17100 Çanakkale TURKEY E-mail: G_Ozdilek@yahoo.com

**** Department of Secondary Science Education, Faculty of Education, Canakkale Onsekiz Mart University

***** Department of Elementary Education, Faculty of Education, Canakkale Onsekiz Mart University

1. INTRODUCTION

Humanity, having the right to live in a healthy environment, continually requires adequate living conditions. However, human dominance over all other species and their addiction to shaping the land they occupy remains a fact of nature (Wang and vom Hofe, 2007). This manipulation of the environment in order to possess better life support systems and to benefit from various products and services makes for the perfect excuse in humans' avoidance of responsibility for the protection of nature on a day-to-day basis (Heilman, 2005). Therefore, people have an immediate urgent responsibility to convey most, if not all, natural sources to future generations by conserving and using them effectively instead of completely destroying, irreversibly harming or uninterruptedly abusing them. All the representatives of natural ecosystems including elements of flora, fauna, water, air, soil, etc., must be protected for the present and future human populations on earth. In other words we have to protect the natural environment to be able to realize a sustainable future. UNESCO's 1977 Tbilisi Declaration is a document which specifically emphasizes the need to address environmental education at all ages, and all levels in order to tackle this complexity of human nature's interaction with the environment. By the 1992 Earth Summit's adoption of Agenda 21, even the term "environmental education" would be renamed as "education for sustainable development" and "education for a sustainable future" in an attempt at addressing this new reality (Tilbury, 1995). Many countries developed policies with a consideration to this need of change in environmental education. In Turkey, primary school (Ministry of Education, 2011a) and secondary school programs (Ministry of Education, 2011b) were reorganized based on a constructivist approach emphasizing the importance of environmental education for a sustainable future. The Scientific and Technological Research Council of Turkey (TUBITAK) has also joined in supporting a number of projects on outdoor education intended for adults.

There are three perspectives to environmental education; education about/ in / for environment (Tilbury, 1995). Education 'about' environment especially includes environmental education in schools, and aims to develop ecological and environmental understanding (Tilbury, 1995). However, turning theory into actual practice tends to occur only rarely (Okur et al, 2011; Nikel and Reid, 2006; Hama et al., 2006). Education 'in' environment focuses on learner-centered and experiential activities and aims to develop awareness towards the natural environment. Outdoor education is specific for this type of learning. Education 'for' environment aims to have holistic perspectives and (encourages active participation in solving environmental problems (Tilbury, 1995). Education in/ about environment is supported by governmental organizations (such as TUBITAK), along with several NGOs Turkey. The people use new education theory/ strategy/ method by integrating these three perspectives each other to achieve environmental education for sustainability. Hale (1986) remarked the value of fieldwork and drew attention to the advantages of using local environmental elements in designing field studies. Actually, according to Lave's situated learning theory (1988), learning is a function of activities, context, and culture in which it is situated. Practice in the environment occupies an important part in learning. The constructivist teaching/learning approaches, which allow the students to be more active in learning

processes, are recommended in teaching environmental relationships (Vance et al 1995). Therefore, the learner-centered strategies in local environmental conditions can be useful in improving the environmental awareness of teachers. The jeopardizing factors facing natural resources can be monitored easily if the structure, elements, and functions of ecosystems are carefully analyzed. This constitutes an approach which is not just philosophical, but problem-solving in its character as well – a most critical argument in pursuing its development further for the sake of enhancing environmental protection (Evans 1998).

There are much more research on environmental education. Rickinson (2006) for example is especially critical of these environmental researches, citing researchers' tendency to overlook "learning, process, and theory". For environmental learning to be an integral part of the researcher's life; Cobb et al (2003) offered "design experiments" to offset such challenges as being able to focus on what is actually thought instead of what learners learn, and to take into consideration what happened during the process rather than what learning outputs were more important. Design experiment is a methodology and looks at learning as "engineering". The researcher has a designed context and this context is entailed to test, revision, and successive iteration. Design experiments are expected to lead to the development of theories and contribute to the learning process (Cobb et al, 2003). We focused on learning and process in this research. As well as selecting the best teaching/learning methods, the contents of the program were also considered important. Moreover, there is a lack of literature dealing with actual content of ecology based outdoor environmental education programs in Turkey – which is hoped to serve as ample justification. TUBITAK has financially supported these education programs for the past ten years, and the contents of all previous environmental programs have been designed by the project coordinators. In this article, we intend to address the problem of a lack of proper description of program contents justifying their place in environmental education. The project description, which is supported by TUBITAK and implemented in 2008 and 2009, gives detailed explanations.

There were three aims in undertaking these projects. Firstly, to give participants a short yet effective introduction to Canakkale's geological, archeological, historical, and biological characteristics using a scientific approach. Secondly, to channel them towards thinking about the anthropological and environmental problems in the province of Canakkale, and thirdly, to try and develop in participants an environmentally- sound consciousness after widening their perceptions of an ecology-based sustainable environment. An additional purpose of this project was to construct a bridge between the public and academics. It is therefore hoped that the project was capable of providing a flow of knowledge towards an effect on the results of scientific studies.

This article discusses the reasons why ecology-based outdoor environmental education projects are unavoidable, and looks at the content of nature education along with engaging the question of how to educate volunteer participants about nature in the environment. This article describes two projects which

were supported by TUBITAK and conducted in 2008 and 2009, coded 108B023 and 109B031, respectively.

2. IMPLEMENTATION

2.1. Selection of participants (target group)

Undergraduate BSc students, graduate students both at masters and doctorate level, along with teachers from primary through secondary schools of varying major branches (e.g. history, geography, etc.) were selected as the prospective participants in the program. Applications were made online.

Teachers were considered as the primary participants due to the fact of their ability to educate a wide range of students and the eventual common effect the project hoped to have on society. Research assistants and graduate students were considered with the hope of their becoming scientists in various institutions in the future. Overall, it was hoped to reach a wider audience through the applied education received by the participants.

The criteria for selecting these particular participants is that the target group was expected to learn the language of the local nature, to gain an effective understanding and insight into natural elements and their differing roles through the adoption of a scientific approach. The aim, therefore, was an analysis of the concept of an “ecosystem” and the development of a critical evaluation of current environmental problems. Teachers working in rural areas are accepted as having a higher educational level compared to the locals. Yet the teachers’ knowledge of such issues as perception of the ecosystem, the balance of nature, the relationship between producers and consumers as well as decomposers, food cycles, biodiversity, and their importance in life is not complete since it tends to be too general, too theoretical, and overall superficial. Moreover, teachers are generally unaware of the local problems concerning the environment. Indeed, they are not even able to analyze the experience and knowledge brought forward by the grandparents of the village locals. For this reason, teachers tend to provide inadequate, superficial, and unconvincing answers to environmental problems. All the educators who participated in this project were employed at Canakkale Onsekiz Mart University, and almost all had studied the chosen field of study in those particular locations. Therefore, all lectures included in the study schedule directly related to scientific examples and results obtained in the area.

2.2. Program content

During preparation of activities, the understanding that people and products of humanity are elements of nature was accepted as an integral starting point of the project. To ignore the presence of humankind in nature is erroneous; moreover, to exclude the products of people from the ecosystems is conflicting with the concept of ecological integrity. From this point of view, the topics of the program

were tailored as parts of a whole, and each was carefully selected in order to allow connections between the topics, thus forming a meaningful whole.

The program was based on “holistic” concepts in which an “ecosystem” is defined as a part of nature that forms connections like a web between biotic and abiotic elements. In other words, the program components were designed to take into consideration the ecosystem, and ecology that focuses on the structure and function of the ecosystem (Pickett et al 1994, Holling 1998, Maurer 1999, Korfiatis 2005).

1. All ecosystems have abiotic factors and knowledge of such abiotic factors is critical. The abiotic factors of ecosystems are: inorganic materials (air, water and calcium, magnesium, potassium, nitrogen and phosphorus contents of soil, etc.), organic materials (carbohydrates, proteins and lipid) and the physical characteristics (climate, temperature, lithosphere movements, geomorphology, etc.). In this project, activities related to abiotic factors and their importance for the ecosystems are as following:

A further component included in the program concerned humankind’s place in the universe. Discussions took place on the following topics: Astrophysics and finding directions at night-time. Are we alone in the universe? How our planet is seen from space. Formation of the universe. The Big-Bang theory. How water came to earth. The history of the earth from its beginning. Is it possible or not for other life forms to exist in the universe? For the duration of one night, the locations of the main stars used to find directions were shown and the participants were tested on the information provided by the lecturer.

Geological structure and history of Canakkale province: Geological specifications of the Gallipoli and Biga peninsulas were introduced. Information about earthquakes, landforms, landslides, etc. was summarized in the field. Natural resources and non-renewable sources formed due to geological activities were emphasized, and problems and solutions with respect to utilization of such sources were discussed. Applied knowledge was emphasized. The section of road linking Canakkale city and Kucukkuyu village was studied on a field trip, and real life examples were observed.

Geographical Information Systems applications and use of GIS in nature: Positioning in the field and pinpointing locations in the field on a map was studied. GPS maps were constructed and explaining locations in relation to coordinates was carried out. Via this activity, participants were able to read the parts of ecosystems and their borders (Bednarz, 2004).

2. Biotic elements of ecosystems (producers, consumers and decomposers) are also important parts of life. These elements are not random in all ecosystems. Ecosystem richness is expressed with a diversity of biotic factors. Canakkale and its environs were introduced with specific emphasis on faunistic and floristic examples underlining biological richness and importance.

Fauna of Canakkale and its environs: Important vertebrates were introduced in the field. Specifically, vertebrate fauna and its importance to Turkey’s biodiversity were emphasized.

Endemic plants in Canakkale: Plants endemic to Canakkale province were shown, endemic plant habitats were visited, and importance of biodiversity was underlined.

Role of insects in protection of nature: The era we live in can be termed the “Insect Era”. The importance of insects for biological warfare and the role of insects in the protection of the balance of nature were emphasized. Relevant examples were given and participants gathered insect specimens using nets in the field.

3. In order to teach about nature, the area of study must include specific features. The natural features within the Canakkale provincial borders fit in well with this definition. The Agi Mountain, Canakkale Strait, Bozcaada Island, Karamenderes Stream, Can Lignite Open Pit Mine, and Dalak Stream on Mount Ida are special types of ecosystem areas. Even with more specific areas, such as Karamenderes Stream at Pinarbasi Bridge, Agi Mountain, and Ciger Lake turba area could be taken as parts of the ecosystem. Within this project, the forest ecosystem, stream ecosystem, and marine and coastal ecosystems were independently covered. Activities related to this topic were as follows.

Water quality and aquatic organisms: Fresh water macro vertebrates, their distribution according to different types of media, and their roles where they were seen were introduced to participants who collected samples, examined them under the microscope, analyzed water quality using basic titration devices, and discussed what they observed.

Forest ecosystems, definition of vegetation and types: Mount Ida and Agi Mountain, which show different vegetation stratification and microclimatic specifications, were also introduced to participants.

Underwater and marine ecology: Following the aims of the project, a lecture on the marine ecosystem was delivered. Marine ecosystems and coastal ecosystems, in addition to the connections between them, were discussed, and examples were given in order for participants to understand that the parts of the ecosystem are unique units. Furthermore, divers assisted the participants in navigating around a designated diving area in order for them to observe biodiversity.

Importance of food supply from nature in Canakkale: Milk from cows, sheep and goats is used in the production of the country-wide famous Ezine cheese. The animals living in this area are especially important because the nature of the milk they produce is affected by the climate as well as the flora of the area. For this reason, the richness of an ecosystem is indispensable from the point of human activities as well as the food supply.

4. The pressure on ecosystems caused by humans cannot be ignored. Humanity, as part of the ecosystem, impacts ecological integrity. Many examples, good and bad, were observed by the participants. By means of such observations, sensitivity to this issue was increased among the participants. The following activities were carried out as part of this theme.

Naturally-occurring and human-enriched magnetism and environmental health: Extremely low frequency (ELF) electromagnetic fields and their effect on public health are a topical issue nowadays. An electromagnetic field is generally observed around high voltage power lines and electric transformation stations. In addition, frequently-used home and work appliances, such as hairdryers, TV sets, solarium booths, etc. cause an electromagnetic field when they are in use, affecting the users and people nearby. Recently, the potential effects of the ultra low frequency of electromagnetic fields (EMF) on people have been recognized with increasing interest being shown in the interests of public health. Participants measured electromagnetic fields near wind turbines, electrical transformation stations, and similar places and observed the effects of ELF and EMF on biotic factors in the environment.

Local bottled water factory and Atikhisar Dam: In the past, almost all water resources were safe if there was no naturally-occurring contamination at or around water supply reservoirs. However, with increasing urbanization, motor vehicle traffic, and mechanization in agriculture and industrialization, both quantity and quality issues arose for water supplies. Many people avoid using tap water for their potable water needs. They prefer bottled water, despite the fact that plastic bottles cause another type of pollution if the empty plastic bottles are not collected and managed properly. Moreover, the carbon footprint of such marketed goods can be enormous if the bottled waters are transported from distant places. Some developed countries pride themselves on the quality of their tap water. For this project, a local example of a bottled water facility was shown, and the geology and basin, as well as water quality, were discussed. Atikhisar Dam nearby, which meets Canakkale's domestic, irrigation and industrial water needs, was also introduced to the participants.

"Can 18 Mart" thermal power plant: Water resources were discussed since one of the most important water consumers is power plants. The water resources of Turkey, water consumers, water supply sources, and natural and anthropological contamination factors that impact water resources and the development and management of water resources, with specific emphasis on groundwater sources, were summarized. The impact on the ecosystem of Can Lignite Open Pit Mine was observed and problems related with open pit mining were discussed. Human energy needs, and how much of the natural environment needs to be sacrificed to meet this energy demand was analyzed. Problems and solutions were discussed by the participants.

Making compost from domestic organic waste: Participants collected waste food material and obtained information about their physical and chemical properties, along with how to solve the solid waste problem in cities, where solid waste goes after it is deposited in garbage cans, and how to manage solid waste in urban areas. Yard and kitchen waste collected by the participants were composted using a plastic box and a small scale aeration pump. Participants periodically measured fundamental specifications of the compost mixture and at the end of their residence; they charted the measured changes during the composting process. Although this was only an experimental trial, it nevertheless

possesses great practical potential on a much larger scale in the event of local administrators realizing the usefulness of composting as a waste management tool.

Ethnobotany: People have used herbs and plants in their lives from time immemorial. From ancient times up to the present, ethnobotany customs and traditions have been developed and people have made remedies, aromatics, teas, etc. from different plants. Since Mount Ida offers a great variety of plants, the use of such plants in ethnobotany was discussed giving real life examples.

Troy National Park from prehistoric times to the present: From 3000 BC onwards Troy has been an important human settlement. Mythology, archeology, and war for possession of natural resources are all important factors why so many people visit this site. There are similarities between the Trojan War and the Gallipoli Campaign during World War I. These two conflicts have provided academics with ample material for the study of this environment, such as why this area was settled and fought over and what connections can be made with the ecosystem of the area.

Importance of Canakkale from historical perspective: The Canakkale Strait and its importance during World War I for the Ottoman Turks and Australians-New Zealanders, as well as the British, French and Russians, were discussed. The area was visited and the role of having a common goal, instead of personal or individual goals, was emphasized.

Development of national parks using protective and utilization measures: The national parks of Turkey and in Canakkale were introduced and the importance of national parks and protected areas was emphasized. National parks play an important role in the preservation of the natural habitat. Other types of nature protection were also discussed. Protection and effective utilization of nature were underlined.

Environmentally correct urban planning in Canakkale: How Canakkale city urban structure was shaped by ecological elements was explained. The estuarine system, the city being at the narrowest part of the Canakkale Strait, the defense structures on both sides of the Strait and the style of pre-modern houses were discussed. The previous architecture and current architectural trends were compared and how to use the language of nature in construction was also discussed.

Ecotourism: A lecture was given on ecotourism, an alternative approach to tourism. The impact of tourism on the environment was discussed and positive and negative actions in the tourism industry were emphasized.

5. It is important to know the responsibilities, importance, and impact of people on ecosystem elements and connect such elements in order to analyze and produce solutions. For this reason, the analysis of nature, consideration of the human impact on elements of nature, and evaluation of unwanted consequences based on the impacts are all critical for developing personal sensitivity towards the protection of the environment. On this theme, interactive presentations prepared by the group's

participants were organized. These presentations proved the participants' past experiences had been enriched with what they had gained as part of this project. The activities in this step can be summarized as follows.

Discussions/ negotiations took place on the following issues. Our ecological footprints- How we lived 100 years ago, how we live now? "To be or not to be" is all that matters. How our lifestyle affects nature, how much environmental degradation can be attributed to human activities, and how we can find common solutions into everyday life. An average person's life 100 years ago was compared with an average person's life today in terms of production, life style, consumption, and other routine activities. Brainstorming on ideas and solutions as an alternative to the "self-centered" lifestyle ("everything-centered" or "everything matters" life style) was performed.

2.3. Learning-teaching methodology

Traditional and structural learning and teaching techniques were adopted together. Studies performed by each lecturer were shaped to convey those given to the participants on a smaller, local scale. Many practical experiments (such as assessing water quality, measuring electromagnetic fields, etc.) were performed. In addition to observation and question-based teaching, techniques such as experiments and field trips (direct observation in situ) were extensively used. Furthermore, interactive presentations by the participants were expected to reflect a synthesis of their previous experiences and their gains during the project, despite it taking place within a short period. During preparation of the presentations, the participants were also expected to work closely together in teams to achieve the most successful results in order for the knowledge to be permanent. Duration of the project was ten days.

Value Added: During the field trips, some lectures were delivered at local (village) coffee houses in order to allow the participation of local inhabitants. In this way, it was aimed to give voice to the problems of the local environment on a specific issue or location. Moreover, it was found that the local residents participated lively with their ideas, experiences to the discussion. Both group participants and local residents at the villages visited together discussed the problems and developed solutions to such problems.

2.4. Evaluation processes

CIPP (Stufflebem, 2003) model was used for evaluation. Qualitative and quantitative tools have been developed, and applied in order to make evaluations on the effectiveness of the project, along with the development of processes and products. The used tools and methods for data collection are as follows:

1. Questionnaires completed by participants prior to and upon completion of the activities proposed to measure effectiveness of the program.
2. Participants were asked to fill an observation form every two days.
3. All the activities were recorded as visual and auditory

4. The participants directed to write reflective composition about their expectation at the beginning and end of the project.
5. The project assistant recorded case studies about environmental attitudes of participants during the project.
6. Evaluation meeting among participants and trainers were implemented at the end of the project. Participants were asked to rate the effectiveness of the project.

The collected data was analyzed in both qualitative and quantitative terms (Karasar, 2003, O'Donoghue, and Punch, 2004, Yıldırım and Şimşek, 2006). In addition, the participants were asked to make interactive group presentations and these documents were used in qualitative analyses.

3. CONCLUSIONS

In recent years, parallel to the increase in environmental problems, the number of environmental education programs on improving awareness on nature and natural resources has increased. Formal educational programs, scattered in the syllabus of various lessons such as Science & Technology and Geography, are implemented in primary and secondary schools in Turkey. However, these related subjects taught in different lessons are inadequate for efficient learning, and even lesser with regards to the creation of a positive attitude and behavior (Lidstone and Williams, 2006). Similarly, as well as primary school teachers, many secondary school teachers lack enough experience about teaching nature as a result of their exposure to traditional educational programs in their academic lives (Lugg & Slattery, 2003; Moseley et al, 2002). This fact increases the value of conducting a program such as was implemented in Canakkale. We tried to focus on learning and process by design experiment. There were a few more ecological and cultural subjects in program design. We took into consideration intra-relationship and interrelationship of subjects.

Many teachers were eager to protect the environment and classify themselves as being environmentalist, yet many of them did not command sufficient knowledge of the integrity between the language of nature and the environment and cause-effect relationships. The role of the teacher is undoubtedly *the* important factor in education. The program outlined in the current study focuses on teachers and young academicians, who are, or are going to be, supervising teachers in the future. Thus future environmentalists will have accurate scientifically-based knowledge and experience in order to protect, defend and teach about nature – thanks to projects such as the one discussed in this article.

One of the positive feedbacks of this project was some participants' contacting their respective trainers in order to get more information on a particular subject following application. One of the negative outputs of this project was the reproach of participants concerning difficulties in memorizing their learning due to the intensity of the program. The program format comprised at least three ten day application processes in more than one occasion. There are many sensible people who have insight into

the role and impact of nature on the earth. Nevertheless, most of them do not know exactly how sustainable usage of natural resources is implemented in real life. Therefore, ecology-based outdoor education programs might play an important role to increase environmental awareness, to be part of nature itself. People then could help protect nature and our future existence. The findings of this project are expected to spread over a large area with a training program with the aim of contributing towards the protection of nature.

Hands-on practical studies combined with field trips are the most common methods being used to teach about the environment (Storksdieck et al. 2005, Bowen and Roth 2007). Ecology-based outdoor education supports a constructive approach because the students configure new knowledge using previous experiences (Lockman 2006). Nature is a most suitable and unlimited knowledge source for teaching in every sense. Possessing a great variety of flora and fauna elements and many unique ecosystems, Turkey is of considerable geographical importance compared to many European and Asian countries. This project focused only on Çanakkale province and used a small part of the resources there to teach about nature. We hope this and similar projects (started as a result of the personal support of Dr. Sancar Ozaner at TUBITAK) prove pioneering for the sustainable usage of natural sources in terms of transferring knowledge to the public. Today, there are more than ten different ecology-based outdoor educational projects throughout the country that are supported each year by TUBITAK. Moreover, we can also encounter examples of NGO-funded nature education projects supported by private participants (not just by TUBITAK) in Turkey. This is an indicator that environmental awareness is growing in Turkey. It can be said that, on a limited scale so far, ecology-based outdoor education programs in Turkey have succeeded in realizing their objectives.

REFERENCES

- Booth, P.R., Sinker, C.A. (1979). The Teaching Ecology in Schools. *Journal of Biological Education*, 13(4): 261-66
- Bowen, G. Michael, R., Wolff M. (2007). The Practice of Field Ecology: Insights for Science Education. *Research of Science Education*, 37: 171- 187.
- Evans M. McK. (1998). Children Can Make a Difference: Using a Problem Solving, Action Oriented Approach to Environmental Education. New Horizons for Learning. Available at: <http://www.newhorizons.org/strategies/environmental/evans.htm> (accessed 13 September 2010).
- Hale M. (1986). Approaches to ecology teaching: The educational potential of the local environment. *Journal of Biological Education*, 20 (3): 179-84.
- Hama, A.M., Sansone, A., Seitz, J., Stötrler, M. (2006). *Headwater Resources and Headwater Hazards: Perspectives from Environmental Education. Case Study Galtür, Austria*. In: Environmental Role of Wetlands in Headwaters, 181-206..Krecek, J. and Haigh, M. S (editors) Springer. 354 p.
- Karasar, N.(2003). *Bilimsel araştırma yöntemleri*. Nobel Yayın Dağıtım, Ankara
- Heilman, E.E. (2007). *(Dis)locating Imaginative and Ethical Aims of Global Education*. 83-104. Roth K and Gur-Zeév, I. (editors). Education in the Era of Globalization (Volume 16). Springer, Dordrecht, The Netherlands. 249 p.

- Holling, C. S. (1998). Two cultures of ecology, *Conservation Ecology*, Available at: www.consecol.org/vol2/iss2/art4 (accessed 13 September 2010).
- Karabacak, E. (2002). *Ağı Dağı (B1 Çanakkale) Çevresinin Florası*. ÇOMU Fen Bilimleri Enstitüsü Yüksek Lisans Tezi.
- Korfiatis, K. J. (2005). Environmental education and the science of ecology: exploration of an uneasy relationship. *Environmental Education Research*, 11(2): 235 - 248.
- Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. Cambridge, UK: Cambridge University Press.
- Lidstone, J. and Williams, M. (2006). *Researching change and changing research in geographical education*. Lidstone, J. and Williams, M. (editors). *Geographical Education in a Changing World. Past Experiences, Current Trends and Future Challenges*. Springer, Dordrecht, The Netherlands. 1-18pp., 250 pages total.
- Lockman, K. L. (2006). *The development, pilot, and evaluation of an on-line course titled nres 410/610 teaching about the environment outdoors*. Master of Science Natural Resources environmental Education and Interpretation College of Natural Resources University of Wisconsin.
- Maurer, B. A. (1999). (Ed.). *Ecological complexity: the macroscopic perspective*. Chicago, IL, University of Chicago Press.
- Nikel, J. and Reid, A. (2006). *The role of responsibility in making sense of education for sustainable development: notes from a tri-country study of student teachers' understanding(s) of education, sustainable development and ESD* In *Bildung für eine nachhaltige Entwicklung Aktuelle Forschungsfelder und –ansätze*. Rieß, Werner and Apel Heino (Editors), VS Verlag für Sozial Wissenschaften, Wiesbaden, pages 51-67, total 200 pages.
- O'Donoghue, T. and Punch, K. (2004). *Qualitative educational research in action: doing and reflecting*. RoutledgeFalmer pub.
- Yıldırım A, Şimşek H. (2006). *Sosyal bilimlerde nitel araştırma yöntemleri*. Seçkin Yayıncılık.
- Ministry of Education, Secondary School Programs, 2011b, <http://ogm.meb.gov.tr/programlar.asp>, 02.06.2011.
- Ministry of Education, Primary School Programs, 2011a, <http://iogm.meb.gov.tr/pages.php?page=program>, 20.09.2011.
- UNESCO (1977) International Conference on Environmental Education, Final Report, Tbilisi 14-26 October 1977, http://www.gdrc.org/uem/ee/EE-Tbilisi_1977.pdf, 20.09.2011.
- Rickinson, M. (2006) Researching and understanding environmental learning: hopes for the next 10 years. *Environmental Education Research*, Vol 12, No 3-4, pp 445-457.
- Cobb, P., Confrey, J., diSessa, A., Lehrer, R. & Schauble, L. (2003) Design Experiments in Research. *Educational Research*, 32 (1), p 9-13.
- Stufflebeam, Daniel L., The CIPP Model for Evaluation, in *International Handbook of Educational Evaluation*, Part I (Ed. Thomas Kellagan, Daniel L. Stufflebeam, Lori A. Wingate). Kluwer Academic Publishers, Netherlands, 2003.
- Storksdieck, M., Ellenbogen, K., Heimlich, E. J. (2005). Changing minds? Reassessing outcomes in free-choice environmental education. *Environmental Education Research*, 11 (3), 353- 369.
- Tilbury, Daniella (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research*, Volume 1, Issue 2, 195-212.
- Okur, E., Yalcin-Ozdilek, S., Sahin, C. (2011) The Common Methods Used In Biodiversity Education By Primary School Teachers (Çanakkale, Turkey). *Journal of Theory and Practice in Education*, 7 (1), 142- 159. http://eku.comu.edu.tr/index/7/1/eokur_syozdilek_csahin.pdf, 20.09.2011.

Lugg, Alison & Slattery, Deirdre. Use of national park for outdoor environmental education: An Australian case study. *Journal of Adventure Education & Outdoor Learning*, Vol. 3, No. 1, p. 77-92, 2003. <http://www.tandfonline.com.ezproxy.waikato.ac.nz/doi/pdf/10.1080/14729670385200261>, 21.09.2011.

Moseley, C., Reinke, K., Bookout, V. (2002) The effect of teaching outdoor environmental education on preservice teachers' attitudes toward self-efficacy and outcome expectancy. *The Journal of Environmental Education*, 34 (1), 9-15. <http://proquest.umi.com.ezproxy.waikato.ac.nz/pqdlink?vinst=PROD&fmt=6&startpage=1&ver=1&vname=POD&ROQ=309&did=272341311&exp=09-19-2016&scaling=FULL&vtype=POD&rqt=309&TS=1316644246&clientId=8119>, 22.09.2011.