International Electronic Journal of

Environmental Education

Volume 2 - Issue 2 - June 2012

IEJEE Green

www.iejeegreen.com

INTERNATIONAL ELECTRONIC JOURNAL OF ENVIRONMENTAL EDUCATION
Vol. 2, Issue 2, June 2012

ISSN: 2146-0329

www.iejeegreen.com

International Electronic Journal of Environmental Education (IEJEE-Green) is an international refereed academic journal which publishes research papers on all aspects of environmental education. The aim of the journal is to provide a thoughtful forum for environmental researchers, practitioners and scholars to further the study and practice of environmental and sustainability education.

International Electronic Journal of Environmental Education is published two issues per year. IEJEE-Green provides immediate open access to its content on the principle that making research freely available to the public to support a greater global exchange of knowledge.

IEJEE-Green is indexed in: Directory of Open Access Journals (DOAJ), Environment Complete (EBSCO), Google Scholar and Index Copernicus.

Publication of any material submitted by authors does not necessarily mean that the journal, publishers, editors, or any of the editorial board members endorse and suggest the content. Publishing decisions are based and given only on scholarly evaluations. Apart from that, decisions and responsibility for adopting or using partly or in whole any of the methods presented in IEJEE-Green pages solely depends on the readers' own judgment.

ISSN: 2146-0329
www.iejeegreen.com

Table of Contents

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 81-92.

Changing Family Habits: A Case Study Into Climate Change Mitigation Behavior in Families

Michel T. LEGER*
Université de Moncton, Canada

Diane PRUNEAU
Université de Moncton, Canada

Received: September, 2011; Accepted: April, 2012

Abstract
A case-study methodology was used to explore the process of change as experienced by 3 suburban families in an attempt to incorporate climate change mitigation behavior into their day to day life. Cross-case analysis of the findings revealed the emergence of three major conceptual themes associated with behavior adoption: collectively applied competences such as self-efficacy and perseverance; shared ecological values among family members; and collaborative family dynamics. Based on these findings, the authors conclude by outlining the lessons learned in terms of their potential for policy makers and possible educational programs for families looking to adopt a more sustainable lifestyle.

Keywords: Environmental education, environmental behavior, climate change mitigation, environmental competences, family systems.

Introduction

This paper contributes to the growing body of research concerned with climate change and the need to adopt more widespread mitigation behavior at the local level. The literature on public awareness of climate change points to general concern, yet there is a lack of meaningful societal engagement with the issue (Whitmarsh & O'Neill, 2011, p.3). For instance, environmental psychology literature reveals a number of factors involved in deciding to adopt environmentally sound behavior (Hwang, Kim & Jeng, 2000; Pruneau, *et al*., 2006). Knowledge, past experiences with nature, established behavioral patterns, values and social networks are just some of the cognitive and affective factors reportedly at play (Kollmuss & Agyeman, 2002). In addition to these factors, perceptions literature identifies important psychological and physiological barriers to change such as dissonance and denial (Seidel, 1998).

In the present study, we look to better comprehend the processes involved in successfully adopting mitigation behavior in families. We are particularly interested in documenting the

* Michel T. Leger, Université de Moncton, Faculty of Education, Department of Primary Teaching and Psychopedagogy, Moncton, NB, Canada. Phone: 1 506 858 4942. e-mail: michel.leger@umoncton.ca

ISSN: 2146-0329

factors influencing their change as a social group and understanding the interaction dynamics involved in their day to day experience of undertaking chosen behavioral changes. Moreover, we are curious as to the various competences demonstrated by family members, both individually and as a social group, as they seek to integrate new environmental behavior. Though literature on environmental behavior has led to a better understanding of influencing factors and barriers to change, few studies have considered these notions as they relate to the family. To the best of our knowledge, fewer still have examined the process of change over several months as it applies to families who want to integrate climate change mitigation behaviours. Our research looks to pursue this very objective, with both policy makers and educators in mind, by reporting on the lessons learned in regards to the processes involved in adopting new mitigation behavior in the context of the family.

Background

Though there are many theories on behavior in psychology literature, two general theories of behavioral change are often cited in field of environmental education: Ajzen's (1991) Theory of Planned Behavior and Prochaska, DiClemente, and Norcross's (1992) Transtheoretical Model of change (TTM). In Ajzen's theory, people's voluntary behavior is determined by three kinds of beliefs: beliefs about the likely consequences of a behavior (*behavioral beliefs*), the opinions of others if they engage or not in a behavior (*normative beliefs*), and the feasibility of the behavior in question, that is, their perceptions of how easy the behavior will be (*control beliefs*). Each of these components has an effect on adopting new behaviors. The TTM (Prochaska *et al*., 1992) has five stages: *precontemplation*, *contemplation*, *preparation*, *action*, and *maintenance* of the behaviour. Located on a continuum, these five stages represent the gradual progression people make from the time they are not thinking about changing to the time the behavior in question has become a habit. The authors explain that some change strategies, such as *reinforcers* and *helping relationships*, used by people themselves or by their caregivers, facilitate the passage from one stage to another in the model. Armitage *et al*. (2004) add that in addition to these strategies, personal self-efficacy (people's opinion of their own ability to efficiently deal with a difficult situation) can also facilitate the passage from one stage to another in the TTM (Prochaska *et al*., 1992).

Several studies have focused on the factors that foster and limit the adoption of environmental behaviors. Pruneau *et al*. (2006) graphically represented the factors that, according to research, seem to positively influence the adoption of environmental behaviors. Pruneau *et al*. groups these factors into three categories, in accordance with Hwang, Kim, and Jeng's (2000) typology: cognitive, affective, and situational.

Cognitive factors directly influence environmental action (Hungerford & Volk, 1990). However, Hwang, Kim, and Jeng (2000) consider that knowledge alone does not guarantee the adoption of an environmental behavior because such a change also presupposes expressing the intention to act. People's competences equally have an impact (Hungerford & Volk, 1990). Competences are generally defined as a set of resources: cognitive (e.g., knowledge, know-how, knowing how to act), metacognitive (e.g., knowing how to observe, control, and improve one's cognitive strategies); conative (motivation to act); physical and social (calling on an expert); spatial (efficient use of space); temporal (relevant organization of time); material (use of a book); and affective (Joannert *et al*., 2004). In fact, little research has identified the environmental competences associated with adopting climate change *mitigation* behavior in families.

Moreover, the intention to act often appears where affective factors are concerned, that is, a person's (public or non-public) expression of their wish to act (Hines, Hungerford, & Tomera, 1986/1987). Altruism, characterized by empathy and solicitude, represents another important affective factor (Berenguer, 2007; Borden & Francis, 1978). Accordingly, individuals who prioritize altruistic values often have marked environmental beliefs and tend to engage more in pro-environmental actions than those who hold egoistic values (Joireman *et al*., 2001; Gärling *et al*., 2003).

Throughout the literature, researchers almost always collected their results by interviewing participants when new behaviors had turned into habits. Few researchers observed, over an extended period of time, the experience of people who began integrating and attempted to maintain such behaviors. This kind of research is nevertheless important. For instance, a better understanding of how families integrate climate change mitigation behavior could lead to policies that are more effective in reducing our impact on the climate, especially from levels of government which are closer to the people (e.g. municipalities). A better grasp on how families and communities can change their greenhouse gas producing habits seems even more important today in light of a virtual political withdrawal from climate change mitigation policies on the national scene in Canada. Indeed, Stoett (2009) points to a lack in federal leadership on this issue in Canada, citing the following cuts, all in the past six years: the much publicized *One Tonne Challenge*, 40 public information offices across the country, funding for scientific and research programs on climate change and the *Home conservation rebate plan*.

From an environmental education standpoint, implementing such policies should include educational elements to help families succeed in their attempted behavioral change. The present research looks to contribute to the scientific foundation for improved policies aimed at fostering climate-friendly family-wide behavior by (1) examining which daily family habits are easier and more difficult to change and (2) exploring the influence of the group competences, strategies, and inter-relational dynamics on integrating sustainability behavior in families.

Method

Research Approach

The methodological approach guiding the present study is rooted in the qualitative research paradigm. Since the focus of our inquiry is on the processes of interaction among members of participating families, we adopt a social constructivist point of view regarding our findings. A qualitative approach was applied to all aspects of the research design: inquiry, data collection and data analysis. Thus, the present report uses quotes from participants to interpret the complexity of the problem (the public's lack of action in light of impending global climate change) and attempts to inductively establish patterns or conceptual themes in order to better understand behavioral change in families.

Study Cases

Our research is a multiple case study (Creswell, 2007) in which we followed three suburban families living in Dieppe, a small Canadian city, as they attempted to incorporate various climate change mitigation behavior into their day-to-day life over the course of eight months. Our study was also exploratory as it examined the adoption of environmental behavior in a new context, that of the family.

Two criteria were used to choose cases: families in which at least one member expressed prior environmental attitudes and a wish to change, as well as families who accepted to share their experience with the researchers. Potential participating families were identified

by sending out letters outlining the study to parents of grade seven students already involved in a school sponsored environmental project. From the two classes solicited, five families returned the letter indicating their interest in the present research project, hence their intent to adopt a more sustainable family lifestyle. Two of these families eventually withdrew due to time concerns, leaving three case families. Of these three retained cases, two were nuclear families of four, whereas the other was a blended family of five. In the *results* section, Table 1 presents further details on members of these families as well as their reported environmental behavior before and after the project.

Data Collection

Throughout the project, family members chose (without any help) new behaviors they wished to try and the pace at which these new behavior were to be integrated. All three cases were accessible and ordinary cases from which we collected data through multiple sources: individual journals, personal interviews (prior to starting their chosen actions as well as after one, three and eight months), and family group interviews (same frequency as personal interviews). Confidentiality was provided in all aspects of this research as we assigned pseudonyms[*] to members of each family and kept data secured and available to involved researchers only (with written consent from all participants prior to beginning the study). Approval was also obtained by the Université de Moncton's Ethics Committee on research involving human participants following a review of proposed methodology including all data collection tools.

Firstly, we conducted preliminary interviews with the participating families in order to better understand the characteristics of each case. During the project, members of each family kept a reflexive journal in which he or she wrote information about his or her personal process of change: behaviors that were integrated, attitudes toward these behaviors, and the successes and challenges encountered. The journal also included specific questions on the strategies employed by the participants to change their habits, on the personal competences that helped, and on the elements of the family dynamic that may have influenced the process. Here are a few examples of the questions found in the reflexive journal: *Could you describe the actions that you are engaged in that will help the climate? How is it going? Could you tell me about what happens in your family regarding actions to help the climate? Could you describe about the means used by your family to successfully carry out these actions?*

During individual interviews, the participants were asked to talk more about the experiences that they recorded in their reflexive journal. Here are a few examples of the questions asked: *Could you talk to me about the means used by your family and yourself to successfully carry out the actions you chose? Could you talk to me about the help you received from some members of your family? Could you talk to me about what drives you to continue performing your actions?* As planned, we conducted individual interviews at the beginning of the project, as well as one and three months later. At each of these points in time, we also conducted a group interview with each family in which open non-directed discussion took place between members regarding their change experience. Throughout these unstructured family meetings, a secondary researcher mediated the conversation while the principal researcher acted as an observer and focused on the family dynamics during the decision-making process.

Data Analysis

From the 30 interviews and collected monthly journals, a within-case thematic analysis was first undertaken to identify and describe the various themes surrounding the discourse of all

[*] All names in this article are pseudonymes.

case-family members. During this process, two analysts independently established codes to represent emerging themes within each case and compared their results. In order to identify various competences, the two analysts used the Table of Competence Indicators proposed by Kerry (2010). For instance, Kerry associates citizenship with a sense of duty and a desire to contribute to a common good. Kerry also links self-regulation to one's ability to control emotions and perseverance to one's refusal to quit in the face of adversity. An inter-rater reliability score of 96% was then calculated, contributing to the validity of established themes.

From these theme codes, the data were then refined through the writing of narratives (Giorgi & Giorgi, 2003). A total of 3 narratives were written for each case, representing the progression of each family through the change process after one month, three months and eight months. Both descriptive and interpretive in form (Van Manen, 1990), they chronologically recounted each family's quest for a "greener" lifestyle in terms of the challenges they encountered, their demonstrated competences and inter-member relational dynamics. Adding to the validity of results through triangulation, all narratives were subsequently returned to participants for verification of authenticity. Working with the corroborated narratives, we then looked at similarities and differences across cases in order to isolate the principle themes common to all cases.

Finally, a third level of analysis was applied using "conceptual categories analysis" (Paillé & Mucchielli, 2008, p.233). During this phase, we looked to establish general conceptual constructs by centering on apparent relationships between common themes. Adapted from a template suggested by Creswell (2007, p.172) for coding a multiple case study, Figure 2 illustrates the levels of analysis used in this study.

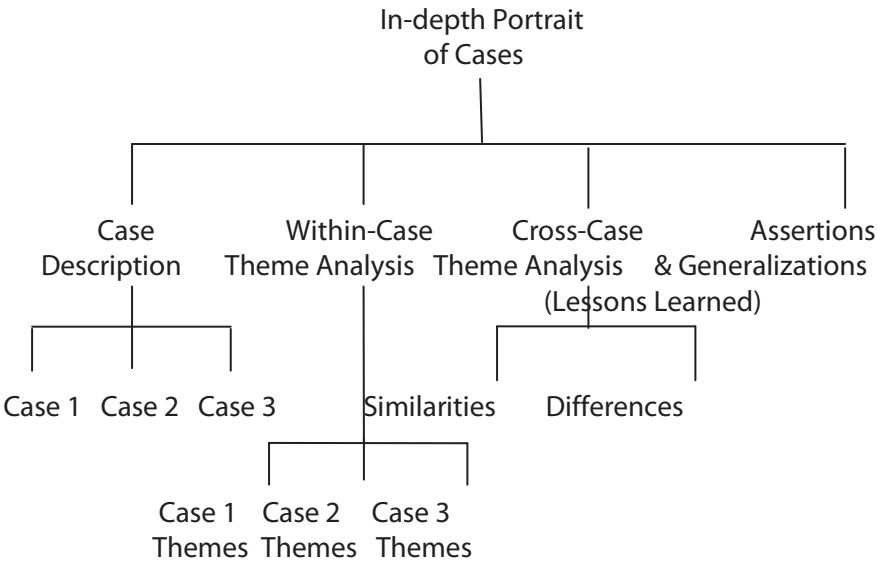

Figure 1. Levels of applied analysis

Results and discussion

By the end of the study, both the Landry and Pelletier families were able to integrate several easier energy saving behaviours like shutting out the lights, reducing hot water use as well as reducing waste and plastic use. In fact, these two families maintained such actions throughout the eight-month study. However, in both these cases, the participants had

difficulty integrating more difficult actions such as carpooling. Though the Goguen family was also successful in implementing similar behaviors in the short term (all of the actions attempted by the first two families were also tried by the Goguens), these actions were more numerous than in the first two cases and included more complex behavioral changes such as composting, green landscaping and selling their second vehicle. Notwithstanding, after three months, the Goguen family ultimately abandoned the project and returned to initial consumer-dominated habits. Table 1 lists initial routine environmental behavior for each case family before the project as well as behaviors adopted and maintained at the end of the project.

From the various data collected throughout the eight month experimental period, we report that family members who encounter challenges associated with their behavioral change experience tended to apply a number of competences that seem to help them to persist in their targeted behaviours: *collaboration* (Denise: "This project is a team effort… we work together… everyone pitches in with friendly reminders and encouragement"), *citizenship* (Charline: "The impacts of climate change are scary… we need to change our habits so that the planet is good condition for others."), *self-regulation* (Serge: "I don't forget to shut the lights in my room anymore… it's become a habit."), *perseverance* (Roland: "I tried using a timer to limit my time in the shower, but the one I bought didn't work… I found another way."), *self-efficacy* (Jean: "I believe that all the actions we're trying are easy… it's all in the approach and the level of conviction… I believe I can do it."), and *decision-making* (Corinne: "Just the other day, a clerk asked me if I wanted a bag… I thought about the plastic I would have to throw out and answered *No.*").

Table 1.

Reported mitigation behaviors from start to end of project

		Family members		Mitigation behavior at start of project	Mitigation behavior at end of project
Participating Families	**Landrys**	Roland	Father	-Recycling -Shutting lights -Using smaller car for long trips	-Conserving energy -Reducing water use -Using cloth bags -Recycling -Waste-free lunches -Programmable thermostat
		Denise	Mother		
		Charline	Child (age 12)		
		Maryse	Child (age 9)		
	Pelletiers	Gilbert	Father	-Recycling -Shutting lights -Limiting packaging in purchased items	-Conserving energy -Reducing water use -Using cloth bags -Recycling -Reducing use of car -Installed heat pump
		Corinne	Mother		
		Serge	Child (age 11)		
		Marc	Child (age 6)		
	Goguens	Jean	Father	-Recycling -Using bicycle -Using biological cleaning products -Buying local food (sometimes)	-Conserving energy -Reducing water use -Using cloth bags -Recycling -Composting -Gas free mower -Selling second car -Using bicycle & bus
		Debbie	Mother		
		Jacob	Child (age 15)		
		Sandra	Child (age 14)		
		Steve	Child (age 12)		

When we looked at these competences holistically, along with other reported factors such as values and family dynamics, three major "conceptual categories" (Paillé & Mucchielli, 2008,) seemed to emerge in the behavioral change process as experienced by participating families: *collective competency* (i.e., skills manifested by family members which contributed to successful integration by the entire family), *shared biospheric family values* (i.e., a shared

family value system where members apply a cost-benefit analysis in terms of biospheric ecological sustainability) and *collaborative family dynamics* (i.e., a healthy family dynamic characterized by team work and mutual understanding between members). Table 2 attempts to describe these three conceptual constructs by offering details such as a definition, a list of defining properties and a few representative quotes from the data.

Table 2.
Defining the major conceptual constructs identified through cross-case data analysis

Major Conceptual Themes	Collective Competences: *Collaboration* *Citizenship* *Self-regulation* *Perseverance* *Self-efficacy* *Decision-making*	Definition	Competences demonstrated by the family as a group in its attempt to affect collective behavioural change.
		Properties	- All family members demonstrate the competencies to some degree. - Demonstrated competence by one fosters that competence in others. - Competences are manifested in response to challenges.
		Supporting Excerpts	*We have a positive family attitude… everybody helps each other out* (Charline Landry on collaboration, journal entry after 3 months). *Making waste-free lunches was hard, but we kept it up … the kids helped … I said we do this, so it was important to me that it work* (Denise Landry on perseverance, interview after 3 months). *We feel like our family is making a difference for the planet* (Roland Landry on citizenship, interview after 8 months).
	Shared Biospheric Values	Definition	Shared family values that consider the importance of the planet or biospheric.
		Properties	- Values are common to all family members. - Values are based on a cost-benefit analysis in terms of planet-wide or biospheric sustainability.
		Supporting Excerpts	*Climate changes hurt the planet…we need to do something about it as a family… for polar bears and other animals* (Charline Landry, interview after 1 month). *My goal was to stop behaving in a way that harms the environment, but the problem was that my wife and kids did not share that same objective* (Jean Goguen, closing interview after 3 months).
	Collaborative Family Dynamics	Definition	Family dynamics characterized by collaborative interactions between members.
		Properties	- Family members work together as a team towards shared goals. - Mutual understanding is inherent to all systemic interactions. - Family dynamics resemble those of a balanced system.
		Supporting Excerpts	*I think we succeeded our actions because we collaborated all together, when things went well and when things were harder … we worked as a team* (Roland Landry, interview after 8 months). *We communicate well as a family… everybody helps out and we're in this thing as a family* (Corinne Pelletier, interview after 3 months).

Like Kaiser and Wilson (2004), we believe that family values play an important role in choosing and sustaining environmental behavior. More specifically, our data seems to indicate that a family's successful integration of mitigation behaviors is facilitated when all members share a collective value system which is altruistic or biospheric in nature. Such a collective biospheric family value system represents the second of our three major emergent conceptual themes. While the Landry and Pelletier families both shared a common

environmentally-sensitive value system, altruistic in nature, the Goguen family lacked such common values. In their case, Debbie, the mother, clearly demonstrated more egocentric values, while her husband Jean was driven by more biospheric values. It is our belief that this lack of a common altruistic value scheme contributed significantly to their difficulty in integrating behavioral change over the course of the eight-month trial. This affirmation seems to be in line with other research. For instance, authors such as Stern (2002) and DeGroot and Steg (2008) suggest a relationship between behavior and one's personal values. DeGroot and Steg go on to specify three types of ethical values that impact environmental action: egocentric values (considering the costs and benefits of action in terms of personal well-being), altruistic values (considering the costs and benefits of action in terms of impact on other human beings), and biospheric values (considering the costs and benefits of action in terms of ecological or biospheric well-being). Our findings seem to echo those of other studies that show that personal values that are altruistic and biospheric lead to more environmental behavior (Stern & Dietz, 1994; Van Vugt, Meertens & Van Lange, 1995).

Finally, the reported competences associated with behavioral change in this study seemed to be facilitated by each family's underlying systemic dynamic. In other words, the families that successfully integrated mitigation behavior were those in which members interacted cooperatively, helped each other through challenges and underwent change as a family unit. We believe that certain concepts associated with systems theory apply when considering the family itself as a balanced open system (Salem, 2005, p.57). For example, we attribute the Landry and Pelletier families' successful passage from action to sustained behavioral change (Prochaska *et al*, 1992) in part to the construct of systemic optimal adaptability (Salem, 2005, p.62), whereby all family members may actively participate in the decision making process when faced with a destabilising situation (such as family-wide behavioural change). In the case of the Goguen family, we suggest that this system characteristic was absent or not sufficiently developed, thus contributing to that family's inability to reach the sustained behavior stage of the Prochaska *et al.* (1992) change model. As such, we submit that family dynamics represents a new influencing factor on climate change mitigation behavior in families.

Conclusions: Lessons learned

Firstly, it should be noted that our observations are derived from a relatively small number of cases. However, though our chosen methodology does not allow for generalization, we feel confident in hypothesising that families who hope to adopt mitigation behavior will have a better chance at success if their members share altruistic and biospheric values. Our findings are also in line with social cognitive theory, highlighting the importance of self-efficacy when attempting to adopt climate change mitigation behaviors in the family setting. Accordingly, we believe that families who successfully navigate the process of behavioral change do so by manifesting collective efficacy (Bandura, 1997) along with other collective competences such as collaboration, citizenship, self-regulation, perseverance and decision-making. Thirdly, our findings indicate that family dynamics seem to play an important role in successful behavioral change among members. It is our belief that a family is better equipped to undergo such change when it functions as a well-balanced adaptable system (Salem, 2005, p.62).

In light of these conclusions, we believe further study is warranted in the area of competences as they relate conceptually to the adoption of mitigation behavior. In other words, more research is needed in order to better understand how *collective competences*, skills manifested collectively among all members of a family, contribute to the integration of sustained mitigation behaviors. We also contend that the proposed conceptual constructs

of *shared family values* and *collaborative family dynamics* as an influencing factor on environmental action merits further study. We join Wolf (2011) in calling for more research on "ecological citizens' value systems to explain their … [higher levels of] engagement", a suggestion that acknowledges all three of our proposed conceptual constructs when applied to families. Accordingly, given the inability of the Goguen family to integrate mitigation behaviors despite the father's clear engagement to the process and knowledge as an environmentalist, we are curious as to the potential role of collective competences and collaborative system dynamics in the case of a family where an equally suitable father-figure is able to successfully foster sustained mitigation behaviors. Such a study would offer further insight as to how families can successfully change their daily habits and thus contribute to climate change mitigation at a local level.

In conclusion, we believe that our findings stand to play an important role in the development of any potential educational program aimed at facilitating a shift to a "greener" life for the average suburban family. Given our evidence for the conceptual constructs present in this study's participating families, we contend that such educational programs should consider the following points in their design: (1) a preliminary stage in which common biospheric values are shared and established as guiding principles for the entire family throughout the process of change; (2) frequent opportunities to share ideas, review common goals and foster a sense of contribution and collaboration among all family members (potentially through group activities); and (3) periodic moments throughout the program where members can celebrate successes, thus reinforcing their perception of self-efficacy and contributing to collective efficacy within the family.

Finally, we believe that our research into collective sustainability behavior in the context of the family is in line with Environmental Education objectives such as fostering awareness of the environment and contributing to knowledge, values and competences that foster action, both individually and collectively, in response to environmental problems (UNESCO-UNEP, 1988, p.6). As such, our findings point to a need for more locally implemented policy initiatives where people are encouraged to rally together towards a common goal of climate change mitigation. For example, such policies could capitalize on the popularity of social networks by incorporate an experience sharing component (e.g. Twitter, Facebook), thus potentially mobilizing an entire community. According to Donner (2007), the most effective emissions policies to date have taken place at the community level. We need to bring back initiatives that blend education and action, similar to the now abolished *One Tonne Challenge* (in Canada), and strive to get people involved in their implementation at the local level.

♦ ♦ ♦

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.

Armitage, C. J., Sheeran, P., Connor, M. & Arden, M. A. (2004). Stages of change or changes of stage? Predicting transitions in transtheoretical model stages in relation to healthy food choices. *Journal of Clinical and Consulting Psychology, 72*(3), 491-499.

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: Freeman.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs NJ: Prentice Hall.

Berenguer, J. (2007). The effect of empathy in proenvironmental attitudes and behaviors. *Environment and Behavior***.** *39*(2), 269-283.

Borden, D. & Francis, J. L. (1978). Who cares about ecology? Personality and sex difference in environmental concern. *Journal of Personality, 46*, 190-203.

Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches*. Thousand Oaks, CA: Sage.

DeGroot, J. I. M. & Steg, L. (2009). Morality and prosocial behaviour: The role of awareness, responsibility and norms in the norm activation model. *Journal of Social Psychology, 149*(4), 425-449.

Donner, S. (2007). Domain of the gods: an editorial essay. *Climatic Change, 84*(3-4), p.231-236.

Gärling, T., Fujii, S., Garling, A. & Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of proenvironmental behaviour intention. *Journal of Environmental Psychology*, *23*(1), 1-9.

Giorgi, A. P. & Giorgi, B. M. (2003). The descriptive phenomenological psychological method. In P. M. Camic, J. E. Rhodes & L. Yardley (dir.), *Qualitative research in psychology. Expanding perspectives in methodology and design* (243-274). Washington, DC: American Psychological Association.

Hines, J. M., Hungerford, H. R. & Tomera A. N. (1986-1987). Analysis and synthesis of research on responsible pro-environmental behaviour: a meta-analysis, *The Journal of Environmental Education, 18*(2), 1-8.

Hungerford, H. R. & Volk, T. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education*. *21*(3), 8-21.

Hwang, Y. H., Kim. S. L. & Jeng, J. M. (2000). Examining the causal relationships among selected antecedents of responsible environmental behavior. *The Journal of Environmental Education, 31*(4), 19-24.

Joannert, P., Barrette, J., Boufrahi, S. & Masciotra, D. (2004). Contribution critique au développement des programmes d'études : compétences, constructivisme et interdisciplinarité. *Revue des sciences de l'éducation*, *30*(3), 667-696.

Joireman, J. A., Lasane, T. P., Bennett, J., Richards, D. & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. *British Journal of Social Psychology*. *40*(1), 133-155.

Kaiser, F. G. & Wilson, M. (2004). Goal-directed conservation behavior: the specific composition of a general performance. *Personality and Individual Differences*, *36*, 1531-1544.

Kerry, J. (2010). *Les compétences démontrées par des employés municipaux impliqués dans un processus d'adaptation aux changements climatiques (*Master's thesis). Université de Moncton, Moncton, NB.

Kollmus, A. & Agyeman, J. (2002). Mind the gap : Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research, 8*(3), 239-261.

Paillé, P. & Mucchielli, A. (2008). *L'analyse qualitative en sciences humaines et sociales*. Paris : Armand Colin.

Poupart, J., Deslauriers, J.-P., Groulx, L., Laperrière, A., Mayer, R. & Pires, A. P. (1997). *La recherche qualitative. Enjeux épistémologiques et méthodologiques*. Montréal : Éditions Gaëtan Morin.

Prochaska, J. O., DiClemente, C. C. & Norcross, J. C. (1992). In search of how people change: Applications to addictive behaviours. *American Psychologist*, *47*(9), 1102-1114.

Pruneau, D., Doyon, A., Langis, J., Martin, L. Ouellet, E. & Boudreau, G. (2006). The process of change experimented by teachers and students when voluntarily trying environmental behaviours. *Applied Environmental Education and Communication, 5*(1). 33-40.

Salem, G. (2005). *L'approche thérapeutique de la famille*. Paris : Masson.

Seidel, P. (1998). *Invisible Walls: Why We Ignore the Damage We Inflict on the Planet- and Ourselves*. New York: Prometheus Books.

Stern, P. C. (2002). Towards a coherent theory of environmentally significant behaviour. *Journal of Social Issues*, *56*(3), 407-424.

Stern, P. C., Dietz, T. & Guagnano, G. A. (1998). A brief inventory of values. *Education and Psychological Measurement*. *58*, 984-1001.

Stern, P. C. & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues. 50*(3), 65-84.

Stoett, P. (2009). Looking for leadership: Canada and climate change policy. In H. Selin & S. D. Vandeveer (Eds.) *Changing climate in North American Politics: Institutions, Policymaking and Multilevel Governance* (47-64). Cambridge, MA: MIT Press.

UNESCO-UNEP (1988). International Strategy for Action in the Field of Environemental Education and Training for the 1990's, Paris: UNESCO, ED-87/conf. 402/col. July 1 1987, 44 pages.

Utzschneider, A. & Pruneau, D. (2010). Students' decision-making process during a sustainable development project. *The International Journal of Sustainable Development and Word Ecology. 17*(1), 39-47.

Van Manen, M. (1990). *Researching lived experience*. London: The Althouse Press.

Van Vugt, M., Meertens, R. M. & Van Lange, P. A. M. (1995). Car versus public transportation? The role of social value orientations in a real-life social dilemma. *Journal of Applied Social Psychology*, *25*, 258-278.

Whitmarsh, L. et O'Neill, S. (2011). Introduction: Opportunities for and barriers to engaging individuals with climate change. In L. Whitmarsh, S. O'Neill & I. Lorenzoni (Eds.) *Engaging the public with climate change: behaviour change and communication*. Washington: Earthscan.

Wolf, J. (2011). Ecological Citizenship as public engagement with climate change. In L. Whitmarsh, S. O'Neill & I. Lorenzoni (Eds.) *Engaging the public with climate change: behaviour change and communication*. Washington: Earthscan.

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 81-92.

Aile Alışkanlıkları değişiyor: Ailelerin İklim Değişikliği Azaltma Davranışına Yönelik Bir Vaka Çalışması

Michel T. LEGER[*]
Université de Moncton, Canada

Diane PRUNEAU
Université de Moncton, Canada

Özet

Bu çalışma iklim değişikliğini azaltmaya yönelik davranışları ile günlük yaşamda ailelerin yaşadığı değişim sürecini keşfetmek amacıyla banliyöde yaşayan üç aile ile birlikte yürütülmüş bir vaka çalışmasıdır. Bulguların cross-case analizi davranışın benimsenmesi ile ilgili üç ana kavramsal tema: öz-yeterlik ve azim gibi topluca uygulanan yeterlilikler, aile bireyleri arasında paylaşılan ekolojik değerler ve ortak aile dinamikleri ortaya çıktı. Bu bulgulara dayanarak yazarlar, politika yapıcılar ve daha sürdürülebilir bir yaşam tarzı benimsemek isteyen aileler için potansiyel açısından öğrenilen dersleri özetleyen olası eğitim programları oluşturulması önerilmektedir

Anahtar Kelimeler: Çevre eğitimi, çevreye yönelik davranış, iklim değişikliği azaltma, çevresel yeterlik, aile sistemleri

[*] Michel T. Leger, Université de Moncton, Faculty of Education, Department of Primary Teaching and Psychopedagogy, Moncton, NB, Canada. Phone: 1 506 858 4942. e-mail: michel.leger@umoncton.ca

ISSN: 2146-0329

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 93-106.

The Effect of a Nature Camp on The Children's Conceptions of Nature*

Esra Yardimci**
Abant Izzet Baysal University, Bolu, Turkey

Gulsen Leblebicioglu
Abant Izzet Baysal University, Bolu, Turkey

Received: August, 2011; Revised: December, 2011, Accepted: April, 2012

Abstract

In this study, a nature camp which provides authentic learning opportunities for children was conducted. Twenty-four 4th and 5th graders (9 girls, 15 boys) participated to the camp. The camp program started with observations in the forest nearby. More focused observations were also made. Children discussed their observations with their friends and scientists. A questionnaire was applied at the beginning and end of the camp. The results showed that the nature camp program was effective in extending the children's conception of the nature by including both living and non-living things. Most of them started the camp with a conception of the nature which consisted of only living things whereas only four children left with this conception at the end. Biological aspects of the nature also increased. Children generally stated that living or non-living things exist or live together at the nature, but relationships between them were noticed by fewer children.

Keywords: nature camp, nature education, conception of the nature, children

Introduction

Nature is always important for human and has different meanings for different people such as a source, an Arcadia, and a social construction (Lijmbach, Van Arcken, Van Koppen, & Wals, 2002). Some of the people recognize nature as a source for life. Some others define it as an Arcadia. Some people also propose that the nature is a social construction. People's conception of the nature is diverse and needs further exploration.

Children learn many concepts related to the nature and natural processes. Their conception of the nature would affect their learning of these concepts. Thus, children's conception of nature was a concern for researchers and searched in a few studies. An interesting study (Wilhelm & Schneider, 2005) conducted with diverse urban youth (age seven to fourteen) interviewing on nature photographs that 29 participants had taken. They raised eight primary themes in participants' definition of the nature: process, content, locality, origin, life,

* This study was supported by Science and Society Department of Scientific and Technological Research Council of Turkey (STRCT) with a grant number of 108B016.
** Corresponding author. Abant Izzet Baysal University, Faculty of Education, Department of Elementary Science Education , Golkoy, Bolu, Turkey. Phone: +90374 254 1000, e-mail: yardimci_e@ibu.edu.tr

ISSN: 2146-0329

beauty, longevity, and by-products. The nature as process theme included growing, feeding others, eating, dying, changing throughout the day, and its interdependence with nature.

Content of the nature theme was the largest theme and included subthemes: flora, fauna, insects, geological features, atmospheric features, open space, people, and by-products. Flora was the most common theme and trees were the most common examples of flora followed by leaves, grass, general plants, and flowers. Birds were the most commonly mentioned animal under fauna theme. The geological theme included water, rocks, soil, sand, and land features, with water mentioned most frequently. Atmospheric theme included sky at most and followed by clouds, sun, rain, snow, wind, and rainbow. Open space included fields, playgrounds, yards, and neighborhoods. People were mentioned by only eight participants. By-product items were the items made from the nature such as wood, clothes, garbage, sidewalk, fur, and statues. Urban youth participants were also asked what the nature was not. Four themes raised from their responses: built, social, open space, and human influenced.

Cobern, Gibson, & Underwood (1999) studied 16 ninth graders' conceptualization of the nature in their everyday thinking. They conducted interviews with the students about the nature and applied interpretive analysis of the narratives. They concluded that the nature was conceptualized as a composite of a number of different perspectives: aesthetic, religious, conservationist, and sometimes scientific. In their discussions of the nature, most of the students were volunteered little school knowledge about science and did not elaborate them.

Some studies searched both conceptions of the nature and environment (Payne, 1998). Payne searched fourteen 6th graders' conception of the nature in a philosophy course through informal questioning process about practical interests and issues confronting children in their daily lives. Most children conceived the nature as living and non-living things existing naturally in the external environment. Only one child included human. Minimal human influence was identified as a primary characteristic of being natural. Almost all of the students thought that the nature and environment have the same meaning. But, half of them included human made objects in their illustrations of environment. Payne concluded that concepts of the nature and environment were not fully developed in children's mind.

Another comprehensive study about children's conceptions of the nature is Watson (2004) which was a master thesis. Watson conducted an ethnographic and phenomenographic study at a nature camp with fourteen children at different ages from seven to fifteen. Data were collected by participant observation and semi-structured interviews. Watson organized data around seven major categories:

- Attributes which describe relative complexity (big, abundant, unorganized, diverse, and changes)
- Attributes which denote agency (gives, relationships, friend, uncontrollable, purposeful, alive)
- Attributes which denote value (beautiful, interesting, important, simple, not perfect, amazes)
- Attributes which relate to, or are based on, concepts of human manipulation of the nature (Physical-not built or owned, Cognitive-whatever you want it to be, is science)
- Sensations (physical sensations, emotional sensations)
- A place (everywhere, city-based, camp-based, outdoor-based)
- An experience or activity (alone and with others; with others, never alone, through activities, through activities at camp)

If we synthesize the research on the nature concept, the following points would be proposed. Although children conceptualized the nature differently, most of their conceptions were positive. Although categorization of the data was different in each of the qualitative studies, there were some similarities. The children conceptualize the nature as a place mostly consisting of living things. Human is less related to the nature in children minds and if they relate human, they mostly related in a negative way. Nature is not only a scientific concept for children; it has also emotional and aesthetical aspects.

Rationale for the Study

Interestingly, most of the previous research on children's conception of the nature was one-time determination of the conceptions. We could locate only two studies (Marion & Mary, 1994; Dettmann-Easler & Pease, 1999) in which effect of residential nature camps' effectiveness was searched. Dettmann-Easler & Pease studied effectiveness of residential nature camps in fostering positive attitudes toward wildlife. They found that students had significantly more positive attitudes toward wildlife after residential programs than they did after an in-class wildlife program. Marion & Mary (1994) described a two-week nature camp program and reported that it raised campers' self-esteem, increases their interest in, and curiosity about the nature. Watson's (2004) study conducted at a camp, but searched for children's conceptions of the nature through observations and semi-structured interviews throughout the camp. It was not a pre- and post-camp determination of children's conceptions of the nature.

As science educators, we try to introduce the nature to children and teach many concepts and processes about the nature. Environmental education at residential nature camps is applied worldwide, but their effectiveness on developing children's conception of the nature was not searched at all.

Research Question

In this study, a one-week residential nature camp was held with a group of 4th and 5th grade children and effectives of the camp program on children's conception of the nature was searched through pre- and post-camp questionnaires and semi-structured interviews. Thus, the research question searched in this study was 'what was the effect of a one week residential nature camp on the children's conception of the nature?'.

Method

Camp Program

Nature-based environmental education was done at the camp. The camp program was developed by the researchers. The camp program was summarized in Table 1. The camp program consisted of three main blocks of sessions; morning, afternoon, and evening sessions. It included a number of observation sessions at the nature at morning and afternoon sessions, and evaluation of the day and ecology games or social activities in the evenings. In the observation sessions, the children observed various plants, animals, and other living and non-living organisms in their habitats at the nature. The observations were sequenced from close environment to distant environments and also sequenced from big organisms to small organisms. Each kind of activities was described below.

Ecosystem sessions. Three sessions were allocated for teaching ecosystems. First session was observing the ecosystems around the camp site including forest ecosystem and ecosystem in a puddle. The biology professor taught ecosystem concept based on their direct observations. Second session was on lake ecosystem. The children and the camp team went to a big lake close to the camp site by bus. The same biology professor taught lake ecosystem by direct observations at many sites around the lake. Third session was distant

ecosystems. The children watched documentary films about rainforests, deserts and poles. They compared different ecosystems at the end of the session.

Observation sessions. Four observation sessions were included in the camp program. First session was a field trip around the camp site. The camp team prepared approximately ten observation stations in the forest. The observation stations were different trees, different plants including flowers, butterflies, frogs, and puddle. The camp team put a sign on each station. The sign also included the questions to guide children's observations. The children were asked to form four-member groups. Each group was guided by a science educator in the camp team throughout their observations. Six groups were formed and each group started from different stations to save time, but each group visited every observation station and performed the observation task required in each station. They recorded their observation notes on their notebooks in each station and passed to another observation station. They shared their observations at the end of the session.

The following observations were specific observation sessions. Second observation session was on birds. The children worked in small groups with their guide and observed birds around the camp site. They again shared their observations at the end of the session. Third session was observing soil and rocks. They observed different rocks around the camp site. They also observed soil at different depths of a hole which was opened for an unknown reason. The hole was used a learning opportunity for observing and learning about soil. They compared soil by observing by their magnifying glasses and stereo-microscopes. Fourth session was observing in detail session and consisted of observation of ants, insects and worms under the stereo-microscope and leafs under the microscope. They made detailed observations by using technology.

Ecology games. There were three sessions regarding ecology games in the camp program. The first session was a card game. Each group chose a card including information about an animal. The group discussed which animal is it and explained their reasoning to other groups. The second session was a game which simulated carrying capacity of deer habitat. The number of deer in each round of the game was recorded, graphed after the game and discussed. Carrying capacity was taught based on the graph. Third session was eco-system jury. A jury was formed by the children and they behaved as if they were in the court discussing if the Abant Lake should be a national park. The Abant Lake was close to the camp site and observed in lake ecosystem session. It is a big lake which had bio-diversity around the lake. It is included in natural park statue because of the richness of the ecosystem in and around the lake. But it is not included in national park statue. National park statue is the highest statue and they were like natural reservation areas. If Abant Lake is included in the national park statue, all hotels around the Abant Lake will be demolished. This is a local socio-scientific issue which was also discussed by local stake holders.

Interdisciplinary sessions. Two sessions were interdisciplinary which related the nature to other areas. First session was mathematics in the nature session. The children collected pine cones and flowers around the camp site and a mathematic educator taught Fibonacci numbers and golden spiral on them. The second session was the nature and art session. In this session, the children designed a photograph frame with natural materials that they collected in the field trip. The session was monitored by an art educator. Then, they listened to 'four seasons symphony' of Vivaldi and talked about four seasons in the symphony.

Participants

Participants were 24 children from different elementary schools. Nine of them were girls and 15 of them were boys. They were at 4th and 5th grades. They were ten or eleven years old.

Camp Staff

The camp was conducted by a team of science educators including researchers of the study. The coordinator of the camp was an associate professor of elementary science education. There were five graduate students doing masters study on elementary science education. There was a biology professor who taught lake eco-system. He left the camp after his session. But other members of the camp team stayed at the camp site throughout the camp. They stayed in the same houses with children. Each one of the camp team stayed with four or five children in the same house in order to be in close contact with children and watch for their safety.

Camp Site

Camp site was a village town consisted of duplex houses each of which could accommodate four or five people. It was nearby a forest and was close to a lake. The camp site had biodiversity and thus supported children's observation of many living and non-living components of the nature at their context.

Questionnaire

In order to find out the effectiveness of the camp program, a questionnaire developed by the researchers applied at the beginning and at the end of the camp. To understand the children's ideas better, individual semi-structured interviews on the questionnaires were conducted immediately after the children filled out the questionnaire. The questionnaire included ten open-ended questions about the nature and some other ecological concepts. Data from one question about the definition of the nature and interview data for this question are presented in this paper. Data analysis was interpretive analysis (LeCompte & Preissle, 1993). The first researcher coded the data and discussed them with the second researcher. Then, they inductively categorized the codes until they were satisfied with the organization of the data for modeling children's conception of the nature. Both researchers worked together during data analysis and negotiated their ideas continuously. Thus, the agreement between them was always sustained by negotiation. The same methodology was applied for both pre- and post-camp data and then the results were compared and interpreted.

Results

The coding scheme of the data was summarized in Table 2. Analysis of children's definitions of the nature resulted in two major categories such as biological and non-biological aspects. Biological aspects were the components of the nature and relationship between components. Non-biological aspects were aesthetic aspects, emotional aspects, health, and activities at the nature. Each category will be described and pre- and post-camp data will be compared in separate sections.

Biological Aspects

Most of the children described the nature by stating its components at both beginning and end of the camp. Most of the children indicated existence of these components together or just stating that these components live together at the nature in their definition whereas only some of them indicated the specific relationships among them.

Components of the nature. At the beginning of the camp, most of the children defined the nature by only living things. They sometimes used 'living things' as a general term without specifically indicating the name of the animals or plants as exampled in the following quote:

> *Nature is a place where living things live together, being fed by other living things (H.B.B).*

On the other hand, some children specifically stated animals and plants in their definition. An example for such definitions is as follows:

> *I think the nature is a place where the living things can live. These living things are plants, animals and people (E.N.).*

In such definitions, plants were more frequently stated than animals. In some definitions 'plants' was used as a general term, but in others plants specifically named such as trees , flowers, grass, and green. Green is used as a general term for green plants in Turkish. Trees were the most frequently stated plant in children's definitions of the nature. The pattern was similar for animals. In some of the definitions 'animals' was used as a general term, but in some of the definitions, human and birds were specifically stated. Human was coded into animal category because of the biological classification.

Less children stated both living and non-living components of the nature in their definitions. They used concrete examples of air and water such as clean air, lakes, sea, and rivers.

> *Nature is a place which has lots of green plants and many living-things. Trees, lakes, animals, plants, rocks, humans, e.t.c exists at the nature. (H. O. pre-test)*

At the end of the camp, almost all of the children included both living and non-living components of the nature in their definitions. An exemplary quote for such definitions is the following:

> *According to me, nature is a place on which living things and air, water, soil, and stones exist together. I mean plants and animals by living things. (Y.Ç.)*

Living components were more varied and frequent as it is expected. Plants and animals were most frequently stated and even microscopic organisms and fungus emerged in the children's definitions at the post-test. Although they used animals as a general term, various animals were specifically given in their definition such as human, birds, ant, squirrel, insects, chicken, etc… Similarly, plants were used as a general term and sometimes specified as trees, flowers, and grass.

Nonliving-things mentioned in children definitions were air, water, and soil. Air was usually used as a general term, but three children specifically stated oxygen in the air. Water was used as a general term by five children whereas three children specifically stated lakes, sea, and puddles. Soil and mountains were also emerged at the end of the camp.

There were only four children left defining the nature by only its living components at the end of the camp. They used plants and animals as general terms, only a few of them stated specific plants such as trees, flowers, and grass. Only one child stated specific animals which were ant, birds, dog, and squirrel.

One child went further in his conception of the nature and stated microscopic organisms and fungus in his definition of the nature;

> *I think the nature consists of living and non-living organisms which are plants, animals, fungus and microscopic organisms. When I think the nature, green, forest, trees and clean air e.t.c. comes to my mind.(A.A.).*

Two children indicated ecosystems in their definition of the nature. Although they learnt about eco-systems during the camp, only two of them related eco-system to the concept of the nature.

> *Nature is a place where living and non-living organisms live together as an eco-system. (B.Ç.)*

Relationship between the components. In children's definition of the nature, there were also expressions about how these components relates to each other in the nature in addition to

the components. Nineteen children indicated relationships between components at the beginning of the camp whereas all of them indicated relationships between components at the end of the camp. In a few definitions at both beginning and end of the camp, it was stated that the components of the nature exist at the nature together. In such definitions, there was not any indication of the relationships between these components other than existing together:

Nature is a large place in which plants and animals exist. (B. O. pre-test)

On the other hand, in some other definitions, there was implication of relationship between the components. There were 17 statements indicating a relationship between the components at the beginning of the camp and it increased to 21 at the end of the camp. These relationships were further classified as 'living-thing to living-thing relationship' and 'non-living to living-thing relationship'. Non-living to living-thing relationship was mentioned by only one child stated as 'plants grow by the rain'. On the other hand, living-thing to living-thing relationships were relationships between plants and animals and more noticed by the children. The frequency of living-thing to living-thing relationships was 16 at the beginning of the camp and increased to 20 at the end of the camp. Among these relationships, almost half of the relations at both beginning and end of the camp stated in general as 'living together' as in the following quote;

Nature is a place where people, animals, and plants live together. (H.B.B.)

In other half of the definitions, specific relationships between the components of the nature were indicated such as 'trees provide oxygen', 'animals eating plants', 'plants provide shelter for animals', and 'animals hunt each other'. An exemplary quote is as follows:

I think the nature is a place where plants and animals live. It is a place which has green and beauty. It provides shelter for animals. Herbivorous animals eat plants (E.G.).

This child stated two specific relationships as 'plants provides shelter for animals' and 'herbivorous animals eat plants'. The most frequently stated living-thing to living-thing relationships were 'trees provide oxygen' and 'plants providing shelter for animals'.

Table 1. *The nature camp program*

Hours	*1st day*	*2nd day*	*3rd day*	*4th day*	*5th day*	*6th day*	*7th day*	*8th day*
Morning Sessions (9am-13pm)		Pre-test application (questionnaire about the nature, and interviews on the questionnaire)	A field trip around the camp area (observations at many stations such as trees, plants, butterflies, frogs and puddle)	Ecology Games II (a simulation game about habitat of deer and its carrying capacity. Providing the data from the game and graphing)	Ecosystems around the camp (visiting forest, puddle, and teaching ecological concepts at the nature)	Distant Ecosystems (watching documentary about rainforests, deserts and poles) Observation of ants and their behavior	Observing birds (observing birds around the camp area) Sharing and discussing the role of birds in eco-system)	Post-test application (questionnaire about the nature and interviews on the questionnaire)
Afternoon Sessions (3 pm-7pm)	Coming to the camp	Mathematics at the nature (Fibanocci numbers, golden spiral)	Sharing and discussing the field trip observations	Nature and Art (designing a photograph frame with the materials from the field trip and listening to four seasons symphony of Vivaldi)	Eco-system of a lake (observing biological diversity in and around the lake)	Sharing and discussing the role of the ants in the eco-system Observing soil (observation of soil and rocks by magnifying glass and stereoscope)	Observing in detail (observing ants, insects, worms under the stereoscope and leafs under the microscope)	Presenting learning products constructed during the camp to parents Certification
Evening Sessions (8pm-11pm)	Welcome party	Evaluation Getting rest	Ecology Games I (guess which animal is it?) Evaluation Getting rest	Forming small groups Evaluation Getting rest	Creative Painting (painting a T-shirt) Evaluation Getting rest	Sharing and discussion of observations made during the day Evaluation Space Observation (observing constellations)	Ecology Games III (Eco-system jury, Discussing whether Abant Lake should be a national park or not) Evaluation Party	

Table 2. *Categorization of the data about children's conceptions of the nature at the beginning and end of the camp.*

Biological Aspects	Components (24)**(24)**	Only living things(15)**(4)**	plants (trees(6)**(3),** green(6), plant in general(6), flowers(2)**(1)**, grass(1)**(1)**), animals(human (8), animals in general(5), birds (1)**(1)**, **ants(1), dogs(1), squirrel(1)**), all living things(7)	
		Both living and non-living things(9)**(20)**	Living components	plants (trees(10)**(14)**, green(2)**(4)**, grass(1)**(1)**, flowers(1)**(2)**) Animals (animals in general(8)**(14), human(6), birds(4), ants(1), squirrel(1), worm(1), insects(1), chicken(1), cow(1)) (microscopic organisms(1), fungus(1))**
			Non-living components	clean air(3), oxygen(2)**(3)**, lakes (2)**(1)**, sea(1)**(1)**, rivers(1), **air(6), water(5), soil(5), mountains(5), puddles(1)**
	Relationship between components (19)**(24)**	Just co-exist (2)**(3)**		
		Related to each other (17)**(21)**		General-living together (10)**(10)**
			Living-thing to living-thing interactions (16)**(20)**	Specific relations (trees provide oxygen(4)**(3)**, animals eating plants (1)**(2)**, **shelter for animals(4)**, animals hunt each other (1), **affect each other(1)**
			Non-living to living-thing interactions (1)**(1)**	plants grow by the rain (1)**(1)**
Non-biological Aspects	Aesthetic aspects (9)**(3)**	a beautiful place(6)**(3)**, a pretty place(1), providing scenery (1), places which color the world(1)		
	Emotional aspects (9)**(6)**	silence(1)**(1)**, comfortable life(1)**(1)**, adventure(1)**(1)**, enjoyable(1)**(1)**, joyful(1), peace(2)**(2)**, happiness(2)		
	Health and clean (4)**(4)**	to be healthy(3)**(2)** and clean environment(1)**(2)**		
	Activities at the nature (4)**(4)**	picnic (2)**(1)**, camping(1), resting at shade(1), **riding bicycle(1), climbing mountain(1), nature sports(1)**		

Note: Frequency of codes shows children's each statement, frequency of categories shows each children's items in their definitions. Bolded codes and numbers represent post-test data.

Non-biological Aspects

There were also non-biological aspects stated in the children's definitions of the nature. Non-biological aspects were similar at the beginning and end of the camp. All of the non-biological aspects of the nature stated by the children were positive indicating that they have an innocent and a positive conception of the nature. They were categorized into aesthetical aspects, emotional aspects, health, and activities.

Aesthetic aspects. Aesthetic aspects of the nature were mostly indicated in the children's definitions of the nature. At the beginning of the camp, they indicated that the nature is a beautiful and a pretty place, provides scenery, colors the world and makes the world beautiful. These children think the nature as a beautiful place which colors the world.

> *To me, the nature colors our world and adds beauty. Nature is a place which has trees and green. Beautiful places in the cities would also be the nature. (V. B. pre-test)*

At the end of the camp, aesthetic aspects about the nature were less and about the beauty of the nature.

> *Nature is beauty. It is a place which is covered by trees. (O. S. post-test)*

Aesthetic aspects of the nature were less stated at the post-test, since children talked more about biological concepts about the nature after the camp.

Emotional aspects. At the beginning of the camp, emotional expressions emerged from the definitions were happiness, peace, joyful, enjoyable, adventure, comfortable life, and silence.

> *Nature is a place which is green and has birds and animals. It is silent and provides scenery. It is also adventurous when you climb mountains. (O. S. pre-test)*

At the end of the camp, emotional aspects were peace, enjoyable, adventure, comfort, and silence.

> *Nature is a place which has trees. It is peaceful, silent, and adventurous. (O.S. post-test)*

As it is evident in the quotes, emotional aspects were very similar at both beginning and end of the camp.

Health. At the beginning of the camp, a few children defined the nature as to be healthy and clean environment.

> *I think about forest when I hear the nature. Because, forests are healthy places for humans. Living at the nature is great. There would be differences between a human living in a city and another human living at the nature. The one living in the city would be more nervous than the one living at the nature. Because, there is less oxygen in the cities. But, people living at the nature are more peaceful and happier than people living in the cities. (İ. İ. pre-test)*

At the end of the camp, a few children defined the nature as to be healthy and clean environment.

> *Green color comes to my mind when I hear the nature. Then, I think about trees, mountains, and animals. In other words, a clean environment which has not any dirt. (T. Y. post-test).*

Activities at the nature. At the beginning of the camp, some activities done at the nature emerged in the definitions were going for a picnic, camping, and sitting in the shade.

At the end of the camp, activities done at the nature were picnic, riding a bicycle, nature sports, and climbing a mountain.

Activities at the nature were also similar at the beginning and end of the camp and all of them were human leisure activities.

Discussion

The purpose of this study was to determine the effect of a one-week residential nature camp on children's conception of the nature. When the living and non-living components stated at the beginning and end of the camp were compared, it is evident that children's conception of the nature extended. The number of the children who included both living and non-living components in defining the nature increased from beginning to the end of the camp. Furthermore, they also included soil, a critical component of the nature, in their definitions at the end of the camp. Living and non-living components stated at the end of the camp also enriched.

The results also showed that children described the nature mainly by biological aspects as components and relationship between the components. Children thought that plants were more basic in the nature than animals, and also human. Components of the nature were mostly living things which includes plants, animals, and sometimes human. Human were least mentioned in the children's definitions of the nature whenever they talked about human, they mostly indicated doing some recreational activities at the nature.

Similar results were reported in earlier studies. 'components of the nature' category in this study was named as content of the nature in Wilhelm & Schneider (2005) study. Plants (flora) were most common and symbolized by trees in both studies. Animals (fauna) were the next and symbolized by birds. Humans were mentioned less in both studies. 'Geological' theme in Wilhelm & Schneider's study corresponded to 'non-living' category in this study and water was the most common in both studies. Theme of 'processes' in Wilhelm & Schneider's study somewhat corresponds to 'relationships between components' category in this study. The 'relationships between components' category was coded in further detail in this study and living-thing to living-thing relationships were more than non-living to living-thing relationships. The 'relationships between components' category in this study and 'processes' theme in Wilhelm & Schneider's study were the second common statements in the children's expressions about the nature. Aesthetic aspects also emerged in both studies, but named 'beauty' in Wilhelm & Schneider's study.

The study presented in this paper was similar to Watson (2004) study which was also conducted in a residential nature camp, but Watson determined the children's conceptions of the nature throughout the camp and thus there was no comparison from beginning to the end of the camp. The organization of data was also different and makes the comparison of two studies difficult. 'Nature is alive' and 'nature is relationships' categories were classified under 'attributes which denote agency' category in Watson's study. 'Nature is alive' category corresponds to 'components of nature' category in this study which also mostly included living things. But, 'nature is relationships' category in Watson's study, implies nature as a friend and nature as a family, and thus they were more about emotions and communities. Although it was named with the same words, this category is very different from 'relationships between components' category in this study which implies the relationships between plants and animals. 'Nature is beautiful' was classified under 'attributes which

denote value' category is similar to 'aesthetic aspects' in this study. 'Sensations' category in Watson's study is very similar to 'emotional aspects' category in this study. We did not code a place category in this study, but as it is evident from the exemplary quotes given throughout the paper that most of children definitions of the nature started with 'nature is a place …'. 'Experience and activities' category in Watson's study is very similar to 'activities' category in this study. In short, the children's conceptions of the nature was found to be similar in two studies, but organized in different coding schemes. There were other categories which did not emerge in this study indicating that Watson collected more thorough data from children regarding their conception of the nature.

Although the classification of the data is different in previous studies, there are basic elements of the children's conception of the nature. Nature is not only a biological concept for children, but it also has aesthetic and emotional aspects to a great deal. Children's conceptions of the nature reported in the literature were mostly positive. Plants were basic elements of the conception of children, and then came animals, and human was the least. When they stated human while they were talking about the nature, they were mostly indicating recreational activities. They indicated non-living things such as water, soil, and air less than living things. They mostly stated non-living things as concrete examples at the nature such as mountain, river, clouds, e.t.c.

Our categorization of the data is somewhat more detailed in the part of relationship between the components of the nature and adds up to the literature that children noticed living-thing to living-thing relationships more than non-living to living-thing relationships. Most of the living-thing to living-thing relationships were the benefits of plants for animals and human such as providing oxygen, food, and shelter for animals. If this finding is combined with the finding of plants being stated most frequently than animals and a lot more than human, it would be concluded that the children's conception of the nature was largely based on plants and plants' relationship with animals and human. They stated interaction between animals such as hunting each other less than plant oriented relationships.

They talked about some non-living things in the nature while they were talking about the content or components of the nature, but they did not relate non-living things to living-things. Only one child stated that 'plants grow by the rain' indicating the relationship between plants and water. They mostly stated concrete examples of non-living things such as rivers, seas, mountains, fields, e.t.c. and they were stated as a part of scenery.

Conclusion

The nature camp provided interaction with the nature for a week. The camp program was effective in extending the children's conception of the nature by including both living and non-living things. Most of them started the camp with a conception of the nature which consisted of only living things whereas only four children left with this conception at the end. This was the most positive and clear effect of the camp program. Observing both living and non-living organisms at the nature extended their conception of the nature. Biological aspects of the nature increased at the end of the camp indicating that children learned more biological concepts at the camp. It was concluded that the camp program was effective for children to develop more comprehensive and appropriate conception of the nature.

The children generally indicated that the components of the nature exist or live together at the nature. Most of them did not state specific relationships between the components. Although number of the children noticed the interactions at the nature increased slightly from beginning to the end of the camp, it was less than expectation of researchers. Realizing

co-existence or living together would have been easier and basic than understanding the interactions between plants and animals or interaction of both with water, soil, and air. One-week experience at the nature would not be enough to reach that level of conception. But, camps would not be longer because of the pedagogical aspects such as being away from the family and being expensive. Thus, longer camps would not be recommended, but similar the nature camps would be offered for children at different years.

Children participated this study was at 4th and 5th grades who were only 10 and 11 years old. This was their first camp experience. Thus, it would be reasonable not to have a comprehensive and complex conception of the nature. But, the difference in the data from beginning to the end of the camp indicated their development in understanding the nature.

Further research would be developing camp programs which include more observation of the interaction of components of the nature, it is also recommended to more reasoning activities to help children think more about the interactions at the nature.

Since this is a one time, small size (24 children) study, it needs to be repeated before any type of generalizability can be established.

♦ ♦ ♦

Acknowledgements

This study was supported by Science and Society Department of Scientific and Technological Research Council of Turkey (STRCT) with a grant number of 108B016.

References

Cobern, W. W., Gibson, A. T., & Underwood, S. A. (1999) Conceptualizations of Nature: An Interpretive Study of 16 Ninth Graders' Everyday Thinking, *Journal of Research in Science Teaching*, *36*(5), 541-564.

Dettmann-Easler, D. & Pease, J. L. (1999) Evaluating the Effectiveness of Residential Environmental Education Programs in Fostering Positive Attitudes Toward Wildlife, *The Journal of Environmental Education*, *31*(1), 33-39.

LeCompte, M.D. & Preissle, J. (1993). *Ethnography and qualitative design in educational research (2nd ed.)* New York: Academic Press.

Lijmbach, S., Margadant-Van Arcken, M., Van Koppen, C. S. A. & Wals, A. E. J. (2002) 'Your view of nature is not mine!': learning about pluralism in the classroom, *Environmental Education Research*, 8(2), 121-135.

Marion, D. & Mary, G. (1994) Environmental Education at Summer Nature Camp, *Journal of Environmental Education*, *25*(3), 35-41.

Payne, P. (1998) Children's conceptions of nature. *Australian Journal of Environmental Education*, *14*, 19–26.

Watson, G. P. L. (2004). *Place as educator, concepts of nature: Children, Summer Camp and Environmental Education.* Unpublished Major Paper, York University, Toronto.

Wilhelm, S. A. & Schneider, I. E. (2005) Diverse urban youth's nature: implications for environmental education, *Applied Environmental Education and Communication*, *4*, 10.

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 89-102.

Doğa Kampının Çocukların Doğa Algısı Üzerine Etkisi*

Esra Yardimci**
Abant Izzet Baysal University, Bolu, Turkey

Gulsen Leblebicioglu
Abant Izzet Baysal University, Bolu, Turkey

Özet

Bu çalışmada, çocuklar için otantik öğrenme fırsatları sağlayan bir doğa kampı yapılmıştır. Yirmi dört 4. ve 5. sınıf (9 kız, 15 erkek) öğrencisi kampa katıldı. Kamp programı yakındaki ormanda gözlem ile başladı. Daha ayrıntılı gözlemler de yapılmıştır. Çocuklar gözlemlerini arkadaşları ve bilim insanları ile tartışmıştır. Kampının başında ve sonunda anket uygulandı. Sonuçlar doğa kampı programının çocukların doğanın canlı ve cansız ögeleri dahil, doğa algısına etkili olduğunu gösterdi. Çoğu sadece canlılardan oluşan bir doğa anlayışı ile kampa başlasa da kampın sonunda yalnızca dört öğrenci aynı düşüncede kaldı. Doğanın biyolojik yönüne yönelik ilgi arttı. Çocuklar genellikle, canlı veya cansız şeylerin doğada birlikte yaşadığını belirtti ancak aralarındaki ilişkiler daha az çocuk tarafından fark edildi.

Anahtar Kelimeler: Doğa kampı, doğa eğitimi, doğa algısı, çocuklar

* Bu araştırma, TÜBİTAK tarafından 108B016 numaralı proje ile desteklenmiştir.
** İletişim: Abant İzzet Baysal Üniversitesi, Eğitim Fakültesi, İlköğretim Fen Bilgisi Eğitimi Bölümü, Gölköy, Bolu, Türkiye. Telefon: +90374 254 1000, e-mail: yardimci_e@ibu.edu.tr

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 107-122.

Awareness, Openness and Eco-friendly (AOE) Model Teaches Pre-service Teachers on How to be Eco-friendly

Ananta Kumar Jena*
Assam University, India

Received: January 2012; Revised: May, 2012; Accepted: June 2012

Abstract

This paper studied the empirical pattern to observe the overall attitude of pre service teachers' of different training colleges towards environmental education and practice. Environmental education is a continuous lifelong process, starts at the preschool level and continues up to adulthood via all levels of education. In this context, to know the impact of environmental education on existing pre-service teachers, the researcher has been undertaken three pre-service teacher training institutes of India for experiment, observation and generalization of conclusion. The subjects (n=100) were voluntarily participated for AOE model instruction from three teacher training colleges. After that the participants were responded Eco-friendly thought and Practice Scale (Jena, 2011), which was a two point (yes/no) scale. This scale has four areas; these were Awareness (A), Openness (O), Eco-friendly practices (Ef) Environmental practices (Ep). The main finding showed, AOE model was effective for pre-service teachers, and it enhanced awareness to think for the environment. The participants' shared openly their idea, and information, for the implementation of environmental education. The study concluded that AOE model has significant effect directly and indirectly on pre-service teachers' various eco-friendly practices and healthy living habits.

Keywords: Awareness; eco-friendly practices; openness; education; pre-service teachers

Introduction

Environmental education is now a challenging task in front of world of teacher educators, instructors, and teachers at different level. So many seminars, conferences are going on, but no such effective result found to modify teachers' behavior. Teachers, policy makers, and curriculum framers, only frame the strategy in the written or in ornamental speech, but in practical situation, nothing happens. Who will implement it, where it to be implemented, are the recent questions? How the students and pre-service teachers would realize the practical importance of ecology and environment? Moreover, who will prepare the future

* Faculty of Educational Sciences, Assam University, Silchar-788011, Assam, India. Mob. +919435175089 E-Mail: jena.ananta@yahoo.com

ISSN: 2146-0329

green citizen of our green earth? Therefore, it is in the debate now, and in this context, it should not be limited to classroom transaction only, but to apply it in the daily life to realize its importance. The educators first frame the strategies, and they break first (Jena, 2011). Most of the people have recognized the urgent needs of environmental education, but only some have clear concepts and understanding about the meaning, purpose, needs and the course of content that need to teach to the students of education. This matter is particularly important to prepare teachers who teach in rural and urban schools. They may reshape and re-construct rural identity to support its sustainability for the future. Teachers' value and acquisition of knowledge about education for sustainability will be motivated by the beliefs and beliefs about the instrumentality of one's actions, and their evaluation of the future environmental health of local and distant places on the planet (Boon, 2011). Teachers' have attitude to learn but it has seen appropriate course and educators instructions is too essential to change the pre service primary school teachers' environment attitudes. In this sense, the study conducted by (Ozsoy *et al.* 2011) found the total pre service teachers attending to primary school education showed, the pre service primary school teachers have a high level of environmental attitudes to learn environmental education. Similarly, in a study on ozone layer depletion was the main cause of global warming, found, the pre service teacher education did not seem to have an important effect on student teachers' awareness of global warming (Cimer *et al.* 2011). Education is not for only the acquisition of knowledge of environment, but it helps to search problems related to the environment (Tsevreni, 2011). Therefore, thousands of studies have conducted to find out the solution of different environmental problems through suitable approach and techniques. Most of the findings are helpful for conservation, healthy habit formation, and sustainable development of nature and natural resources. The world of people realized that environmental concerns and awareness could spread only through a mass environment education program at different levels (Amirshokoohi, 2010). Moreover, it is still in question, how environmental issue can be taught through different approaches relate to different attitudes and day-to-day practices in the pedagogical programme among the pre service training schools (Arlemalm-Hagser *et al* 2011). The researches like; Chroinin & Tormey (2012) found, teacher educators favoured a standards-based approach to support consensus within the profession and clear expectations for beginning teachers. They suggested that provision of quality assurance through increased accountability and regulation could enhance the status of the profession based on a democratic ideology of teacher professionalism. However, Zint *et al* 2011, determined, what extent a self-directed learning resource enhances environmental educators' evaluation competencies, found from few (eight) environmental educators have limited evaluation experience on environmental skill.

A few studies have discussed about the implementation of environmental education at colleges, and the result found environmental education is a complex, unpredictable and time-consuming process, which, despite the introduction of cross-curricular attainment targets (Ahuja, 2009). Especially, the implementing environmental education in teacher training colleges using seven criteria: participant engagement, instructor credibility, intention, functionality, self-efficacy, school climate and evaluation, was found that the implementation processes in the two teacher training institutions stagnated owing to personal and organizational obstructions (Eames *et al* 2011;Van petegem *et al.* 2005). It has found a high level of awareness/knowledge among the pre-service teachers' on local environmental problems but low level on global environmental issues. Although, a positive disposition toward environmental issues have demonstrated, which could hinder environmental stewardship, was also noticed (Van Ongevalle *et al.* 2011).

Review of related literature

Environmental education

The concept of environment education emerged from the Stockholm Conference organized by the United Nation in 1968; stressed on both formal as well as non-formal modes. To achieve that, most of the teacher training colleges provide environmental education by using multimedia, observation, field visit, demonstration approaches; and it is an interdisciplinary and diverse nature both in content and in pedagogy (Holdgate, *et al.* 1982). Still, it is in question, how environmental educators provide support for the development of environmental education in general terms and how environmental education will be progressed on coming decades, where, pollution and the emerging scarcity of resources would face of global poverty, climate change and economic issues that are relevant today (Hopkins,2009). However, embedding environmental education within secondary science curriculum is an epistemological and practical difficulty for teachers (Cottrell and Alan, 1997; Steele, 2011). Therefore, skillful teacher education with special reference to environmental education should need to the pre-service teachers and educators to introduce the content and practices in secondary science classes in the ordered manner (Chapman, 2007; Greunewald, 2005). Similarly, Hungerford *et al* 1988; Orr, 1992; Sauvé, 1996 agreed on the complexity of environmental education at interdisciplinary level, on the non-traditional pedagogies classes. Now a day, separate environmental education methodology course also available in online learning for pre-service teachers as well as people of the community for building, sustaining, conserving environment, and in a study, it was found the participants are moderately understood environmental issues and they have lack of significant effect on its application on environment (Hart, 2003). Adding environmental education in pre-service teacher education and university education is just a guiding principle for future teachers, who will teach their students in future (Manzanal *et al.,* 2007; Salomon, & Perkins, 1989). However, there are numerous ways and broad range of venues, for the formal classroom, to outdoor education centers to naturalist clubs. Environmental education embraces related fields like outdoor education, experiential education, place-based education, and environmental science in different situations. These all have a core goal to experience, and learn about and caring for natural environments, including the plants and animals (Ogunyemi & Ifegbesan, 2011). Over the coming decades, every academic discipline will have to respond to the paradigm of more sustainable life practices, because students will be living in a world challenged by competition for resources and climate change (Blake & Stephen, 2011). In the coming decades, as humanity faces unprecedented challenges, what can the discipline or area of research contribute toward a better understanding of these issues? The discipline need not be future-oriented: an archaeologist, for instance, could incorporate into a course some aspects of sustainable archaeological practices in areas threatened by rapid climate change, as well as examples of sustainable or unsustainable ways of living practiced by members of the long-gone society under investigation (Bartels *et al.,* 2011).

Pre-service teacher education programme

UNESCO/UNEP, 1977 stressed on quality and quantity of pre-service professional development in environmental education (EE), has a great impact on learners' potentiality and actual learning. The first systematic study of EE in pre-service teacher education has started in the United States and found that most teacher education programs have few EE related requirements and do not officially institutionalize EE into their programs (McKeown-Ice *et al* 1995). Similarly, a survey of elementary pre-service teacher education programs in the state of Pennsylvania found that EE was not widely institutionalized in the state's pre-

service teacher education programs at the elementary licensure level (Mastrilli e*t al.,* 2001). The most new classroom teachers have not been well prepared through their pre-service professional development to incorporate quality EE into their teaching. Therefore, it is needed to include environmental education at pre service teacher education programme, starting from KG to secondary teacher training programmme (McDonald & Dominguez, 2010). Learners' attitudes toward the environment, found to be a significant determinant of environmental responsibility, and environmental concern held significant association with attitudes toward the environment as well as outdoor activities (Teksoz *et al* ., 2012). In a study, on global warming and the effect of biology teacher education program on their awareness of this environmental issue showed that both groups had some confusions and concerns about global warming. All of the student teachers were under the impression that ozone layer depletion was the main cause of global warming and they assumed that greenhouse effect was completely an anthropogenic phenomenon rather than a naturally occurring process (Bosdogan, 2009). Wesselink and Wals (2011), studied the meanings and possible merits of introducing competence profiles for enhancing professional development in the environmental education at different sectors of Netherland. The study informed the world, how to develop relevant programmes for future environmental educators and pre-service teachers.

Environmental awareness

Pre-service teachers' environmental education directly influences the students' change of behavior because it needs critical thinking, problem solving skill and action-oriented program would provide fruitful conclusions (Kilinc,2010). The study conducted by Shobeiri *et al* 2007; Stern *et al* 1993 found there existed significant difference among Indian and Iranian students in their level at environmental awareness. Female had significance higher levels of environmental awareness as compared to their male counterparts. Palmberg and Kuru (2000) found that outdoor activities are effective among pre-service teachers, reported attitude, value, belief, and behavior contributed significantly to responsible environmental behavior. Environmental problems in China are intensifying and it is vital to evaluate the environmental knowledge, attitude, and behaviors of the generation poised to inherit their management. This study examines a survey of environmental awareness among Chinese students (He *et al.,* 2011). The primary school teachers' in-service training should include interactive teaching pedagogies to enhancing active teaching and learning of EE. It recommends that Ministry of Education should develop and implement an EE policy that empowers schools (teachers and pupils) and surrounding communities to collaborate in taking action to conserve their immediate environments (Zimmerman, 2000). Experience (in this study) deals specifically with encounters with nature and an understanding of children's environmental orientations is of critical importance as opportunities for authentic contact with nature diminish (Haugeback *et al*., 1992). Therefore, educators and researchers should examine the ways that children perceive the natural world. It may also help to identify cognitive and affective aspects of existing environmental education programs that need improvement (Larson *et al.,* 2011). The participants were teachers and principals of the students who participated in the projects and facilitators of two environmental organizations, found diverse views with respect to environmental education, local environmental issues, and possible solutions (Alkaher & Tal, 2011). In a study, evaluation of environmental awareness on their local area and their knowledge about the causes, effects, and solutions pertaining to these environmental issues, found, pupils had ideas about solutions to some of the environmental issues. Environmental education in primary schools might capitalize on pupil knowledge, and hence progress towards environmental action

taking; and how this might occur through primary school pupils being nurtured into the role of informed decision-makers and action-takers (Mutisya & Barker, 2011).

Openness towards eco-friendly practices

Concerns have risen about the preparation of teachers in the area of environmental education. Few tertiary institutions have been undertake teacher education have specific units or modules dedicated to environmental education (Malone, 1999). In an experiment, the findings indicate that most participants felt more confident about teaching environmental education (Liane, 2005). Moreover, environmental education needs improved pedagogical content knowledge and skills, which integrate environmental with everyday learning of their students (Van Petegem *et al.,* 2005). Through instruction, developing efficacy, motivation and confidence among student-teachers (e.g. pre service teachers) towards environmental is a positive sign of learning environmental (Kennelly *et al* 2008). Similarly, one well oriented teacher may aware the students about organic foods, and he/she would predict their behaviors with regard to organic food consumption and other healthy lifestyle (Dahm *et al.,* 2009). From the literatures, it assumed, environmental education creates awareness, enhances openness to share among peers and effect on eco-friendly practices directly and indirectly among the pre-service teachers' healthy living habit.

In this empirical research, the researcher based on directly observed the value and experienced, ideas, practice, and habits among pre service teachers, through quantifying technique, and he has answered the empirical questions of the study. This design helped the researcher to study the existing status of environmental education and practices among pre-service teachers and suggested all teacher educators and pre-service teachers of the world, to improve the existing status. It is important to understand that the outcome of empirical research using a set of working hypotheses or assumptions, which make this research program possible, plausible and successful. This is an inductive analysis works, which could be apply for specific observation for broader generalization.

Awareness, openness and Eco-friendly (AOE) model

The present study was concerned with the Bachelor of Education (B.Ed.) pre-service teachers of India. The whole B.Ed. pre-service teachers of India are the population, and Jena has taken three secondary teacher-training colleges and their students, who were voluntarily participated for the AOE model instruction, were the sample. In the study, 100 pre-service B.Ed. teachers participated in the AOE model of teaching for environmental education for developing eco-friendly practices.

Once again, the question pertinent to this document is how to prepare teachers with respect to awareness, openness and to be eco-friendly. In a general curriculum, teacher education institutions could not be able to develop environmental awareness among pre-service teachers. However, it is a responsible to develop skills associated with issue investigation, evaluation of environmental education among the pre-service teachers. Once these skills develop among the pre-service teachers, it will provide opportunities to apply those skills in their real-life a setting, as is possible (Ramsey, 1987). During AOE model, teachers would certainly benefit from the careful guidance and support of their professors. Moreover, while attending to the development of pre-service teachers' skills, the teacher education programme must ensure the teachers to produce capability to help their students and develop these skills. That gives way to discuss the nature of and methods for encouraging the development of environmental education among pre service teachers.

From the beginning of January, first week of 2011, Jena was purposively selected 100 pre-service B.Ed. pre-service teachers from the population and continued three months instruction by AOE model to find out the result for generalization. This model has two steps and three phases:

Step-I Instruction through AOE model

Phase-I ***Awareness Phase***

For the creation of awareness, the researcher has provided the pre-service teachers with five lectures, two friendly-discussions, one field-visit, and two direct observations at both inside and outside the classroom. He has been encouraged the pre-service teachers to read, to attend different programmes related to environment to develop and behave eco-friendly practices. After that, learners observed a film show related Silchar Medical College & hospital's pollutant and its affect on local water sources and community members. A friendly discussion among the pupil-teachers, related to rising of population, and topic related to family planning, communicable diseases and its affects has arranged. One local brick industry they have visited and realized the Carbon dioxide accumulation in the environment, those they had been observing every day, but not realized its importance.

Phase-II **Openness Phase**

This phase is based on the five stage assessment procedure, which predicts the learners' aesthetics, feelings actions, ideas, and values (Goldberg, 1993; McCrae, 1987; Costa & McCrae, 1992; Gosling, 2008). After awareness phase, the researcher has tried to know their openness. For this, a schedule was prepared to know their aspects of openness after environmental education. Aesthetics is measured the tendency to appreciate art, music, and poetry; and feelings, being receptive the inner emotional states and valuing emotional experience towards environment, and accordingly the yes/no option types items were prepared. Similarly, actions (e.g. how much or frequent the learners tried new activities, visit new places, and try new foods); ideas are the (e.g. tendency to be intellectually curious and open to new ideas at different situations); and values assessed the leaner's (participants) (e.g. readiness to re-examine the traditional, social, religious, and political values).

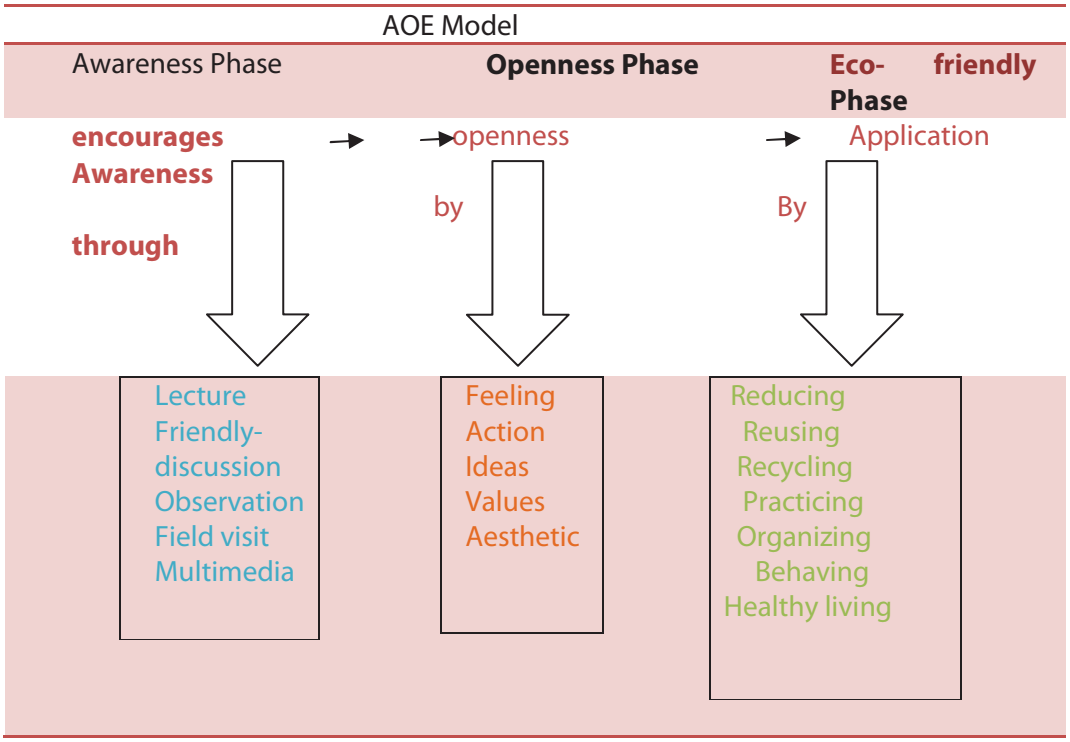

Figure 1. AOE Model

Phase-III Eco-friendly Phase

After phase-II, Jena thought, whether, they are interested to know for reducing, reusing, recycling the unused materials or not? For this purpose, he continued follow up activity, and observed and realized, some of them eco-friendly habit but not all, in the hostel and community centre. During these phases-III, Jena's AOE Model (2011), was treated among the BE.D pre service teachers' to increase their eco-friendly practices. They critically enjoyed the lecture and their collaborate discussion in a friendly environment regarding environmental issues and draw different assumptions. Jena suggested for, buying less and using less. Use common sense ideas like turning off the lights, rain barrels, and taking shorter showers, but also plays a part in composting, low-flow toilets, and programmable thermostats. For the green earth, we should re-think, and obey environmental footprint. Elements of the discarded item are used again. Reuse material, houseware, travel mugs, and cotton bag should use. Different from of energy should use to change the physical properties of the material. Bio-composting, with a high content can recycle refuses at village also.After that, directly, the pre service teachers observed different critical environmental issues. However, the learners individually analyzed the work of peers.

Step-2 Administration of Eco-friendly thought and Practice Scale

After three months instruction, eco-friendly thought and practice scale administered among the samples to observe the effect of AOE model on awareness, openness and eco-friendly habit on environment education, and it was an effort to recognize, how much they behaving greenness towards the green earth as a human being. After, Eco-friendly thought and Practice Scale administration, the researcher has scored, analyzed, and interpreted for result to find out the assumption.

In the present study the researcher has been used single tool developed by (Jena, 2011) which was a two points (yes/no) scale. This scale has three areas; these are Awareness (A), Openness (O), Eco-friendly practices. Each area has (a, b, c, d, e) five statement types of items having two point response (e.g. yes or no). These areas are used to know the effect of environmental education on awareness, openness, and eco-friendly practices (EP) among B.Ed. Pre-service Teachers at secondary level. Each' Yes' response have been weighed 1 and 'No' were 0. It has .75 split half and .80 test- retest reliability coefficient and it has been taken 10-12 minutes for giving response for each sample. The responses were obtained from a two point rating scale, Yes and No type options. Each yes- type response should be counted as 1 and all no type responses should be counted as 0(zero)(e.g. Powell *et al.,* 2011).

From the analysis, it is found, in general, pre-teachers have awareness towards environmental education and they agreed that environmental education enhances openness to share idea, information, for the implementation of environmental education. Similarly, teacher educators and pre-service teachers generally have openness to learn environmental education and eco-friendly. The AOE model, directly and indirectly influences the pre-service teachers healthy living habit (Jena & Das,2011).Their pre-post test score, ANOVA for awareness scores of pre service teachers of three teacher training Colleges was significant($F_{(2,100)}$= 294.1, p<0.01) and the ANOVA for openness was ($F_{(2,100)}$= 43.15, p<0.01) was significant. Similarly, ANOVA for eco-friendly practices on environmental education practices among pre service teachers of teacher training colleges ($F_{(2,100)}$= 65.33, p<0.01) was also significant. Therefore, pre-service teachers, that all three training colleges have seen significant eco-friendly habit developed through learning environmental education.

Discussion

From EE literature, it is seen, willingness to engage in certain types of environmental responsible behavior, increases potentiality to acquire knowledge, creates awareness and openness to practice (Alkaher & Tal, 2011; Kennelly *et al.,* 2008). Jena experienced from the study that environmental education needs efforts for effective teaching to the pre-service teachers and that should be a model training for of the world. During the study, it has found, most of the participants are not interested to discuss more about environmental issues. At the same time, the proper implementation of AOE model and instruction felt them quite comfortable to discuss environmental problems (Jena & Das, 2011). This is a challenging task in front of world of educationist to prepare course materials in the formal, non-formal and informal manner. However, pre-service teachers are interdisciplinary in nature, so it is a challenging task to create awareness, openness and developing eco-friendly habits in front of the researcher. In generally, embedded environmental education offers pre-service teachers the opportunities to broaden their interest and attitude towards the teaching strategies (e.g. AOE model), which provides new hope and new possibility to make significant incremental changes in epistemology and in practice. The response of the project participants, when attend the teaching methods most often associated with environmental education (e.g. lecture, friendly discussion, observation, field visit, multimedia, locally relevant, student-based), was an awareness that those were the components of what they considered to be mastery on desirable environmental pedagogies. However, it is discussed, there is no difficulty, for implementing the AOE model, in pedagogy and practices and it should be included in the curriculum, and classroom transaction at pre-service teacher education or at any levels. Some of those difficulties have been discussed in introduction section of this paper (*i.e. who will implement it, where it should be implemented, are the recent questions? How the student and pre-service*

teacher realize the practical importance of ecology and environment, and who will prepare future citizen of our green earth?). For these questions solution, in the recent study, it was found, pre-service teachers' that all three training colleges have seen aware to learn environmental education and new model (e.g.AOE model) should be included to learning in their future classrooms. This result was supported by (e.g. Chroinin & Tormey, 2012; Eames & Barker,2011; Van Petegem *et al.,* 2005) and they suggested, teacher educators should have favoured a standards approach to support consensus within the profession and clear expectations for beginning teachers. Hence, the pre-service teachers' of the world should be realized and aware to learn environmental education for their healthy practices. Despite the awareness; realization and implementation of EE in their daily practice might feel difficulties; nevertheless, the participants took on that task with enthusiasm and perseverance. The results are encouraging and point to the need of the world for continued collaboration that inspires changes, both in epistemology and in practice. Support to the study Palmberg & Kuru (2000) found that environmental education affects teachers' attitude and awareness significantly. The evidences also found that pre-service teachers have positive attitude, value, belief and behavior, towards new method of teaching (Manzal *et al.,* 2007). Therefore, the pre-service teachers' of the world should realize and aware to learn environmental education for their healthy practices. It was also observed in the study, the pre-service teachers' that all three training colleges have seen open-minded to learn environmental education (e.g. Malone, 1999). Strong awareness among the learners enhances their openness towards environmental education. Pre-service teachers have developed their aesthetics tendency to appreciate art, music, and poetry; and feelings as the inner emotional states and experience through AOE model. The learners have been tried new activities, visit new places, and try new foods; and they have developed new ideas at different situations by re-examining the traditional, social, religious, and political values. The findings indicated that most participants felt more confident about teaching environmental education. Literature also supported to improve pedagogical content knowledge and an appreciation of how to integrate environmental education into the everyday learning of their students (Wesselink & Wals, 2011). Developing efficacy, motivation, and confidence of student teachers towards environmental education is a positive sign of learning environmental education (Kennelly *et al.,* 2008). Hence, the pre-service teachers' of the world have seen open-minded to learn environmental education through Jena' AOE model. The pre-service teachers, that all three training colleges have developed eco-friendly habit and practices after environmental education. This was strongly supported by (Dahm *et al.,* 2009) and they found one well oriented teacher may aware the students about organic foods, and he/she would predict their behaviors with regard to organic food consumption and other healthy lifestyle practices. They may develop the attitude of eco-friendly practices for socially conscious behaviors. This study examined the effect of diaries on self-regulation strategies of the pre-service science teacher's eco-friendly behavior in a challenging and dynamic mode (Jena, 2011).

Conclusion

I concluded, environmental education is not a challenging task for the world of teacher educators, instructors, and teachers at different levels. If seminars, conferences are conducting by the organizers, they should apply the findings and suggestions first at grassroots level or they should utilize first in their day today life. The teacher training institutes, teachers, policy makers, and curriculum framers, should try not only to frame the strategy in the written, but they utilize the idea in practical situation, they have to practice. The teacher educators, teachers, and pre and in-service teachers, professors should implement with hands on experience. It should not be limited to classroom transaction, but

to apply it in the daily life. In this context, embedding environmental education in pre-service teacher education programme both at epistemology and at practice is so crucial (Cottrell & Alan, 1997; Steele, 2011). It should be introduce in the content and practice in primary and secondary classes (Chapman, 2007; Greunewald, 2005), because after training pre-service teachers will utilize this knowledge at both primary and secondary school classes. Similarly, Hart, 2003; Hungerford *et al* 1992; Sauvé, 1996 agreed on the complexity of environmental education at interdisciplinary level. It does not mean environmental education creates no awareness, but a study(e.g. (He *et al* 2011) has been given strong supported that local pupils' knowledge about the causes, effects, and solutions pertaining to these environmental issues are more than town pupils. In generally, in the recent study, it found pre-service teachers' are open-minded to learn environmental education for their healthy practices outside classroom (Kennelly *et al* 2008). They found developing efficacy, motivation and confidence and openness among student-teachers towards environmental education is a positive sign of learning environmental education, which enhances eco-friendly practices and scientific habit to motivate others. That is why; environmental education should embed in teaching learning process and curriculum of pre-service teachers.

The researcher should put the AOE model for the pedagogical practice as an instructional strategy in front of the world of education, for its huge educational implications even it has huge limits tends to evaluation the model. AOE model might be taught through smart classroom, direct observation, field visit and hands on experience, for better understanding among the learners. Effective environmental educations play impact on practice at elementary level. The educationist, administrators, teachers and student, community should participate in local environmental practice programmes. Open, distance learning, corresponding course should be open and free for all age group of learners. Creative drama, role playing, mono action, road side drama should arrange for rural people for the improvement of eco-friendly environmental practices. In my opinion, AOE model should applied for the generalization for long term benefits.

Recommendations

In preliminary, I faced trouble during the implementation of such environmental education model, among pre-service teachers of different teachers' training colleges and I learned a lot from the experiment with this new AOE model. For further study, I have established my AOE model in front of world of education for its proper course development and its improvement. As a result, I recommended my world of colleagues to attempt repeatedly practice and experiment during instruction among the pre-service teachers at the teaching of environmental education.

I consider the following recommendations.

1. Take an environmental issue in the learners' locality

It is better to accumulate the problems and difficulties related environmental issues from the locality through field visit and accordingly content should design regarding awareness (e.g. lecture, discussion, and observation), openness (e.g. feeling, action, ideas and values) and suggests eco-friendly practices (e.g. reducing, reusing, and recycling the materials).After that encourage the instructors to follow that AOE model.

2. Ask what is environment and why for education?

The concept environment includes, both biotic and abiotic components and it is an important task for the instructor to classify. It is in question, whether, learners have clear idea about environmental concepts or not, if found yes, than the teacher educator can

apply AOE model for instruction and if not, they can give a plain lecture or certain demonstration in front of the learners to pick up the learners towards environment.

3. Give opportunities to construct ideas

Teacher can group the learners to work together or implement collaborative activities to share ideas to find out solution for the particular problems. During instruction, the researcher observed most of the learners felt uneasy to express their openness. However, free and open discussions not only foster learners transfer knowledge, but can also emphasize the collaboration or constructive ideas and understanding regarding environmental issues. Learn deeply about a few environmental issues. That is why educators should try to apply this model in the constructivist ways. Besides these, the Jena encouraged their colleagues to experiment the evaluation of environmental educational instruction; courses of different levels. The status of environmental education among the children with special needs section; attitudes of teacher educators towards environmental education teaching and practices; environmental awareness among humanities and a science student needs a comparative analysis; environmental education and sustainable development for eradication of poverty, and comparative study on healthy family life and environmental education.

♦ ♦ ♦

References

Ahuja, L. P. (2009). A study of Environmental awareness among B.Ed. teacher trainees of g overnment, aided and self-financed Colleges. *Ph.d. dissertation, Dravindian University, Kuppam, AP, india*.

Alkaher, I. & Tal, T.(2011). Environmental Projects of Jewish and Arab Youth in Israel: The Adult Leaders' Views. *Environmental Education Research, 17(2), 235-259*.

Amirshokoohi, A.(2010).Elementary Pre-Service Teachers' Environmental Literacy and Views toward Science, Technology, and Society (STS) Issues. *Science Educator, 19(1),56-63*.

Bartels, K. A., Ed.; Parker, K. A., Ed.(2011). Teaching Sustainability/Teaching Sustainably. *Stylus Publishing, LLC*

Blake,J & Stephen S.S. (2011).Tensions and transitions: effecting change towards sustainability at a mainstream university through staff living and learning at an alternative, civil society college. *Environmental Education Research, 17(1), 125–144*.

Boon, H. J.(2011). Beliefs and Education for Sustainability in Rural and Regional Australia. *Education in Rural Australia, 21(2),37-54*.

Bosdogan,A.E.(2009).An investigation on Turkish prospective primary teachers' perception about global warming. *Journal of world applied science,7(1),43-48*.

Chapman, R.L. (2007). How to think about environmental studies. *Journal of Philosophy of Education, 41(1), 59-74*.

Chroinin, D. N. & Tormey, R. (2012). Beginning Teacher Standards for Physical Education: Promoting a Democratic Ideal? *Teaching and Teacher Education, 28(1),78-88*.

Cimer, S. O., Cimer, A. & Ursavas, N. (2011).Student Teachers' Conceptions about Global Warming and Changes in Their Conceptions during Pre-Service Education: A Cros *Educational Research and Reviews, 6(8),592-597*.

Costa, P. T. & McCrae, R. R. (1992). NEO personality Inventory professional manual. Odessa, FL: Psychological Assessment Resources.

Cottrell,S.P. & Alan,R.G.(1997).Testing a conceptual framework of responsible environmental behavior. *The Journal of Environmental Education,29(1),17-27*.

Dahm, M. J., Samonte, A. V.& Shows, A. R.(2009). Organic Foods: Do Eco-friendly Attitudes Predict Eco-friendly Behaviors? *Journal of American College Health, 58(3), 195-202*.

Eames, C. & Barker, M.(2011). Understanding Student Learning in Environmental Education Aotearoa New Zealand.Australian. *Journal of Environmental Education, 27(1),186-191*.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist, 48, 26-34.*

Gosling, S. (2008). Snoop: What your stuff says about you. New York: Basic Books.

Greunewald, D. A. (2005). More than one profound truth: Making sense of divergent criticalities. Educational Studies (American Educational Studies Association). 37(2), 206-215.

Hart,R.E.(2003). A Cyclone Phase Space Derived from Thermal Wind and Thermal Asymmetry.*131 American Meteorological Society*.

Haugeback,K., Milbrath,L. and Enright,S. (1992).Environmental knowledge, awareness concern among 11th grade students. *Journal of Envionmental Education,24,27-34.*

He, X., Hong, T., Liu, L.& Tiefenbacher, J.(2011). A Comparative Study of Environmental Knowledge, Attitudes, and Behaviors among University Students in China. *International Research in Geographical and Environmental Education, 20(2), 91-104.*

Holdgate, M.W., Kassas.M.&White,G.F. (1982). The World Environment 1972-1982: A report by UNEP, Tycooly International Publishing Ltd., Dublin.

Hopkin,C.(2009). Road to Ahmedabad: Embedding Environmental Wisdom in Our Cultural DNA. *Journal of Education for Sustainable Development, 3(1), 41-44*.

Hungerford, H., Litherland, R., Peyton, R., Ramsey, J., & Volk, T. (1988). Investigating and Evaluating Environmental Issues and Actions: Skill Development Modules. Champaign,IL: Stipes Pub. Co.

Jena,A.K. & Das, C.C. (2011).Embedding environmental education in pre-service teacher education programme and practice. *P.G. Dissertation , Assam university, silchar, Assam, India.*

Jena,A.K.(2011). Hands on experience, community participation, observation, field visit, multimedia and demonstration are the predictors of environmental awareness: a hierarchical multiple regression analysis. *International Journal of Environment and Sustainable Development, 10(3),302-322*.

Jena,A.K.(2011).AOE model for pre-service teachers' learning on environmental education. *Assam University, Silchar, India.*

Jena,A.K.(2011).Eco-friendly thought and practice scale (unpublished). *Assam University*. *Silchar, India.*

Kennelly, J.; Taylor, N.; Maxwell, T. W.(2008). Addressing the Challenge of Preparing Australian Pre-Service Primary Teachers in Environmental education: An Evaluation of a Dedicated Unit. *Journal of Education for Sustainable Development, 2(2),141-156.*

Kilinc, A. (2010).Can Project-Based Learning Close the Gap? Turkish Student Teachers and Proenvironmental Behaviours (EJ908945). *International Journal of Environmental and Science Education. 5(4),495-509.*

Larson, L. R.; Green, G. T.; Castleberry, S. B.(2011). Construction and Validation of an Instrument to Measure Environment Orientations in a Diverse Group of Children. *Environment and Behavior, 43(1),72-89*.

Liane,F.(2005).Effect of local learning on environmental awareness in school: an empirical investigation. *Journal of environmental education,36, 39-60*.

Malone, K. (1999). Environmental education researchers as environmental activists, *Environmental Education Research 5(2),163-177*.

Manzanal,F., Rodrignez,R., Luis,B. & Jose,C.(2007).Evaluation of environmental attitude:analysis and result of the scale applied to the university students. *Journal of environmental education,91, 288-1009*.

Mastrilli, T., Johnson, P and McDonald, A. (2001). Inclusion of Elementary Education in Pennsylvania Teacher Preparation Curricula: A Survey of Elementary Pre-Service Teacher Programs. Slippery Rock, PA: Pennsylvania Center for Environmental Education.

McCrae, R. R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology, 52 (6), 1258–1265*.

McDonald,J.T. and Lynn A. Dominguez,L.A. (2010).Professional Preparation for Science Teachers in Environmental Education ,Springer.

McKeown-Ice, R., Brayton, A., and May,T. (1995). Environmental Education in the United States: A Survey of Pre-Service Teacher Education Programs. Knoxville, TN: Center for Geography and Environmental Education & Energy, Environment and Resources Center.

Mutisya, S. M.; Barker, M.(2011). Pupils' environmental awareness and knowledge: A springboard for action in primary schools in Kenya's Rift valley. *Science Education International, 22(1),55-71*.

Ogunyemi, B.; Ifegbesan, Ayodeji (2011). Environmental Literacy among Preservice Social Studies Teachers: A Review of the Nigerian Experience.Applied. *Environmental Education and Communication, 10(1), 7-19*.

Orr, D. W. (1992). Ecological Literacy: Education and the Transition to a Postmodern World, State University of New York Press, Albany.

Ozsoy, S; Ozsoy, G; Kuruyer, H. G.(2011).Turkish pre-service Primary School Teachers' Environmental Attitudes: Effects of Gender and Grade Level. *Asia-Pacific Forum on Science Learning and Teaching, 12(2) Article 5 (Dec)*.

Palmberg, I.E, and Kuru, J. (2000).Outdoor activities as a basis for environmental responsibility. *The Journal of Environmental Education,31(4), 3-6*.

Powell,R.B., Marc, J. S. , Brian D. K., Nicole, A.(2011).Development and validation of scales to measure environmental responsibility, character development, and attitudes toward school. *Environmental Education Research, 17,91–111*.

Ramsey, J. (1987). A study of the effects of issue investigation and action training on characteristics associated with environmental behavior in seventh grade students. Unpublished doctoral dissertation, Southern Illinois University at Carbondale.

Salomon, G., & Perkins, D. N. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist, 24 (2),113-142*.

Sauvé, L. (1996). Environment education and Sustainable Development: Further Appraisal. Canadian. *Journal of environment education, 1, 7-35*.

Shobeiri, S. M., Omidvar, B. and Prahallada, N. N.(2007). A Comperative Study of Environmental Awareness among Secondary School Students in Iran and India. *International Journal of Environmental Research,1(1), 28-34*.

Smyth, J.C. (2006) Environment and education: a view of a changing scene. *Environmental Education Research, 12(3,4), 247-264*.

Steele, A. (2011). Beyond contradiction: Exploring the work of secondary science teachers as they embed environmental education in curricula. *International Journal of Environment and science education, 6(1),1-22*.

Stern,P. C.,Thomas D. and Linda K.(1993).Value oriented, gender and environmental concern. *Journal* of Environment and Behaviour, 25(3), 322-348.

Teksoz, G.; Sahin, E.; Tekkaya-Oztekin, C.(2012). Modeling Environmental Literacy of University Students. *Journal of Science Education and Technology, 21(1),157-166.*

Tsevreni,I.(2011).Towards an environmental education without scientific knowledge: an attempt to create an action model based on children's experiences, emotions and perceptions about their environment. *Environmental Education Research, 17 (1),53–67.*

UNESCO/UNEP(1977). Intergovernmental Conference on Environmental Education, Tbilisi Major Environmental Problems in Contemporary Society, Paris.

Van Ongevalle, J.; Van Petegem, P.; Deprez, S.; Chimbodza, I. J.(2011). Participatory Planning for Project Sustainability of Environmental Education Projects: A Case Study of the Secondary Teacher Training Environmental EducationProject (St[superscript 2]eep) in Zimbabwe. *Environmental Education Research, 17(4),433-449.*

Van Petegem, P.; Blieck, An; Imbrecht, I.; Van Hout, T. (2005). Implementing Environmental Education in Pre-Service Teacher Training. *Environmental Education Research, 11(2), 161-171.*

Wesselink, R.; Wals, A.(2011).Developing competence profiles for educators in environmental education organisations in Netherlands. *Environmental Education Research,17 (1), 69-90(22).*

Zimmerman, B.J. (2000). Attaining self-regulation: a social cognitive perspective. In M. Boekarts, P.R. intrich and M. Zeidner (eds), Handbook of Self-regulation. San Diego, CA: Academic Press.

Zint, M. T.; Dowd, P. F.; Covitt, B. A.(2011). Enhancing Environmental Educators' Evaluation Competencies: Insights from an Examination of the Effectiveness of the "My Environmental Education, Evaluation Resource Assistant" (MEERA) Website *Environmental Research,17(4),471-497.*

Appendix-I

Eco-friendly thought and Practice Scale

Sl.No.	Items	Responses	
1	Lecture and discussion are easy methods to create awareness among learners	Yes	No
2	I can directly and indirectly work for the protection of environment.	Yes	No
3	Field visit aware and encourages how to be eco-friendly.	Yes	No
4	Observation from the field and from different issues of environment motivates to be eco-friendly.		
5	Hands on activity, creates awareness to be eco-friendly.	Yes	No
6	I engage in the constructive work of the environment.	Yes	No
7	Open seminar should necessary at any community places for better discussion,	Yes	No
8	Collaboration among persons of the community, NGOs' and international bodies may create awareness and encourages being a friend to save the environment.	Yes	No
9	Self learning from environment is the best approach for its application.	Yes	No
10	I am anxious to attain huge conferences to share my thinking and emotion for the development of environment		
11	Openness among people encourages to discuss more about environmental issues and practice	Yes	No
12	People sometimes ask why you are so aware in action and practice for the healthy habit.	Yes	No
13	I have created idea to apply these during the natural calamities.	Yes	No
14	I have obligation to play active participation in environmental organization.	Yes	No
15	I see, people polluted without thinking its value.	Yes	No
16	I and my emotion for the conservation and protection of environment are very different from other people.	Yes	No
17	Generally, people do not use creativity, but I apply these in my life.	Yes	No
18	I collect unused plastic appliances for reused as a way of telling people, I am different.	Yes	No
19	I feel frequent change of climate around us.	Yes	No
20	I practice all kind of national and international rules and regulation to save the green earth.	Yes	No
21	I advise the people for sustainability.	Yes	No
22	I use and reusing unsustainable products.	Yes	No
23	It is not possible to recycle the refuses.	Yes	No
24	I like to reuse the plastic products	Yes	No
25	Environmental conservation effort by one man is useless	Yes	No
26	I use daily sustainable material every day.	Yes	No
27	People don't think how to reduce plastic in daily uses	Yes	No
28	I think the new foods sells in market not for good health.	Yes	No
29	I always think how we can reduce the carbon dioxide accumulation.	Yes	No
30	For the development of eco-friendly habit I visit new places, where I can see the way of reuse, recycle process.	Yes	No

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 107-122.

Farkındalık, Açıklık ve Çevre Dostu (AOE) Model: Öğretmen Adaylarına Çevre Dostu Olmak Nasıl Öğretilir

Ananta Kumar Jena*
Assam University, India

Özet

Bu araştırma farklı fakültelerde eğitim alan öğretmen adaylarının çevre eğitimi ve uygulamalarına yönelik genel tutumlarını gözlemlemek için deneysel desen kullanılarak yapılmıştır. Çevre eğitimi devamlılığı olan okul öncesinden başlayıp eğitimin bütün basamakları aracılığıyla yetişkinliğe kadar giden yaşam boyu süren bir süreçtir. Bu bağlamda çevre eğitiminin mevcut öğretmen adayları üzerindeki etkisini bilmek amaçlanmıştır. Araştırmacı test etmek, gözlemlemek ve sonuçları genelleyebilmek için Hindistan'daki üç farklı fakültede çalışmalarını sürdürmüştür. Çalışmaya AOE modelini kurmak amacıyla üç farklı fakülteden (n=100) gönüllü katılmıştır. Katılımcıların doğa dostu düşünceleri ve iki seçenekten (evet/hayır) oluşan uygulama ölçeği ile görüşleri alındı. Uygulama ölçeği dört bölümden oluşmaktadır. Bunlar: farkındalık (A), açıklık (O), doğa dostu uygulamalar (Ef) ve çevresel uygulamalar (Ep)'dır. Sonuçta AOE modelinin öğretmen adayları üzerinde etkili olduğu ve çevreye yönelik farkındalıklarının arttığı belirlenmiştir. Katılımcılar çevre eğitimini yürütmek için düşünce ve bilgilerini açıkça paylaşmışlardır. Çalışmada, AOE modelinin öğretmen adaylarının çeşitli çevre dostu uygulamaları ve sağlıklı yaşam alışkanlıkları üzerinde doğrudan ve dolaylı olarak önemli bir etkiye sahip olduğu sonucuna varıldı.

Anahtar Kelimeler: Farkındalık, doğa dostu uygulamalar, açıklık, eğitim, öğretmen adayları

* Faculty of Educational Sciences, Assam University, Silchar-788011, Assam, India. Mob. +919435175089 E-Mail: jena.ananta@yahoo.com

ISSN: 2146-0329

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 123-132.

Effects of Using Case-Study Method in Social Studies on Students' Attitudes Towards Environment*

Hamza AKENGİN**
Marmara University, Istanbul, Turkey

Gökhan AYDEMİR
Basaksehir Ensar College, Istanbul, Turkey

Received: September, 2011; Accepted: April, 2012

Abstract

This study has aimed to inquired whether there was a significant difference between academic achievement and attitudes of 6th grade students who learned "The Resources of Our Country" unit of social studies through case studies and students who learned this unit with teaching based on existing unit. Besides it was aimed to present thoughts and feelings of the students about the case study method aided learning- teaching process. Pretest-posttest control group design was used in this study and 30 students selected as experimental group while 30 students formed the control group who were from 6th grade from a primary school in 2008-2009 teaching year. During the study, pre-achievement test and pre-attitude scale were applied to the experimental and control group initially and the implementation process was began after it. In this process it was determined that there weren't any significant difference groups in regards to pre-test and pre-attitude tests scores.

Key words: Case study, social studies, environmental, student attitude.

Introduction

Environment is sum of values which constitutes common asset of the human beings. Human beings are in an interaction with their environment as from the moment of their existence. This interaction aims to meet the requirements that necessary for their living. However, excessive consumption and misuse lead to deformation of the nature, which is capable of renewing itself. In this context, one of the most important current global issues is the environmental problem. Environmental issues gradually reach dimensions threatening the natural life and human life in Turkey as well. Unplanned urbanization, improper disposal of wastes, wasting the natural resources such as air, water, and soil, and lack of positive

* This study is based on graduate thesis was titled" The Effect of Case Study Method in Social Science Teaching for The Environmental Awareness Environment and Attitudes Towards Environment of Students" at The Institute of Education Sciences in Marmara University.

** Hamza AKENGİN, M.U. Atatürk Faculty of Education, Goztepe, 34722/ Kadikoy/Istanbul, Turkey. Phone: +905372025851 Fax:+902163388060 E-mail: hamzaakengin@yahoo.com and hakengin@marmara.edu.tr

ISSN: 2146-0329

attitude towards these issues all speed up the process of disturbance of the natural balance. It can be understood that education aims to development of a positive attitude towards the environment at schools, i.e. the environmental education gains more and more importance, to enable elimination of the environmental issues and to develop permanent solutions for these issues. With the goal of growing citizens who are aware of their environmental responsibility, environmental education aims to teach children the environmental knowledge and to improve their awareness as from the 4th grade of the primary education (Adali, 2005, pp. 5-9).

Factors such as rapid population growth, unplanned urbanization, industrialization, production and excessive consumption lead to major environmental issues which are disturbing the ecologic balance. Today's world faces with many environmental issues such as global warming, ozone depletion, greenhouse effect, fertile soil lost due to erosion, extinction of animal and plant species, and forest fires. Environmental education has unquestionable importance in creating an environmental conscience, exhibiting this consciousness in behaviours, and informing people about impacts of their daily behaviours on the environment. Environmental education at schools is considerably important to enable all individuals to understand the environmental issues, to develop permanent solutions, and to foster environmentally-conscious individuals. Having realized this fact, many states prepared and started implementing environmental training programs from 1970s (Unal & Dimiski, 1999, pp. 142-154).

Particularly after the 1970s, concerns relating to the environmental issues led to commencement of international activities which were aimed to solving these issues. 1972 UN Conference on Human and Environment, 1982 UN Report on Our Common Future, and the 1992 Rio Conference were among such major international activities. The Tbilisi Declaration (1977) is considered a milestone in environmental education, because, this Declaration dealt with the details of the nature, goals and foundations of the environmental education on national and international levels. The categories about objectives of environmental educations are specified as awareness, knowledge, attitudes, skills and participation in the Tbilisi Declaration. Following this Declaration, all studies about environmental education have dealt with how to attain the objectives that specified in this Declaration. As a result of these developments, in Turkey, objectives of environmental education have been developed in such way to enable individuals to exhibit responsible behaviours and to help them to become citizens equipped with the supportive knowledge, skills and value judgments (State Planning Organization, 1996).

Current environmental issues' main result is peoples' values and life styles and, this situation has led to different definitions about environmental education that would influence and change these values and life styles. According to some people, the environmental education is a continuous process of learning, through which individuals become aware of their environment, and gain knowledge, skills, values and experiences aimed at solving the environmental issues for the future generations (Keles, 2007).

Environmental education has an unquestionable importance for individuals to get knowledge about their natural and human environment, to use them properly, and to transfer it to the future generations as a common heritage of humanity. An effective environmental education makes it obligatory to conduct in-school and out-of-school activities simultaneously (Hassan, Juahir, & Jamaludin, 2009) cause, theoretical education process within classrooms is not sufficient to draw attention to environmental issues and to develop solutions to these issues. Each individual's contribution to environmental

protection with their own behaviours, particularly as a consumer, requires active participation in the learning experience and taking active responsibilities, and it is emphasized that permanent learning about environmental issues is only possible through active participation of students in the environmental education (Bozkurt & Cansungu, 2002).

Environmental education has complementary objectives both in cognitive and affective areas. While the cognitive objectives try to make individuals literate, the affective objectives create values and attitudes regarding to the environment and environmental issues (Erdogan, 2007). Within this scope, environmental awareness, knowledge, attitude, skills, participation and consciousness constitute the components of the environmental education.

Importance of the environmental education rapidly increases in the changing world, and in education it emphasized more and more. However, it is not possible to say that it is sufficient currently (Alim, 2006). Even though efforts are put forth to develop positive attitude and behaviours through environmental education, it has not reached the expected level yet. Therefore, it is necessary to consider environmental education an indispensable part of formal and non-formal education, and to unify it with the curricula associated with all levels of education.

In new curriculums which were put into practise in 2004 issues about environmental education have distributed. Social studies course that taught from the 4th grade of the primary education is one of these courses. The social studies curriculum includes units, subjects and educational attainments which were aimed in environmental education from that grade. With the subjects included in the social studies curriculum relating to the environmental education, it is aimed to increase students' environmental knowledge, to create positive attitudes towards the environment, and to make students individuals protecting and improving the natural and human environment.

As in other disciplines, success in environmental education is directly proportional to correct selection of teaching-learning methods and techniques. As mentioned above, environmental education have reach to success when learning-teaching methods that require active participation and active responsibilities are used and students become environmentally aware individuals who are protecting and improving the environment. In this context, it is considered by researchers that the "Case-Study Method", which is one of the learning-teaching methods of the constructivist education system, can be effectively applied in the environmental education, and that extremely productive results can be achieved (Adali, 2005; Aydin, 2007; Bilen, 2002; Demirel, 2002; Kucukahmet, 2006) Because, the case-study method is used to o gain knowledge, skills and attitudes about specific issues and to help students to find rapid and effective solutions to such issues through analysis of problems encountered in the real life in connection with a specific subject of learning using the cause and effect relationship. In this context, the case-study method is one of the primary methods that can be effectively used in teaching environmental issues or environmental matters that have been experienced or likely to be experienced.

According to Sonmez (1994) and Tasdemir (2000), the case-based learning method is a method that brings the real life problems to the classroom environment. It is student-centred, and one of the most important benefits of this method is allowing students to develop their problem-solving skills, and to apply their knowledge in real cases. Students can suggest their opinions and develop recommendations for the aim of solving problems like they actually faced a real incident.

Changes are being and should be implemented in the field of environmental education as in many other fields for the aim of fostering modern, environmentally-conscious individuals

who are protecting and improving their environment. Because, environmental education is "a part of the daily life", even in one sense it is "the life itself". Using the case-based learning method is among these developments in environmental education. As one of the modern learning methods away from memorization, case-based learning is an effective method which was applied for the aim of developing solution proposals by establishing a cause and effect relation to a specific problem by involving them with the problems encountered in the daily lives. In this context, the purpose of this study is "Determination of the Effects of Using Case-Study Method in 6th Grade Social Studies on Students' Attitudes towards Environment"

Method

In this study the experimental model was applied due to the fact that it will compare the learning-teaching process supported with case-study learning method and the learning-teaching process based on the existing curriculum. The lessons for the experimental group were studied according to the case study method while the lessons for control group were studied according to the existing program.If a comparison is to be made between the two groups in a study, then the experimental method needs to be used (Karasar, 2000). The experimental model enables data that considering the cause and effect relationship under the control of the researcher for the purposes of obtaining data relating to the subject of the study (Yazicioglu & Erdogan, 2004). The experimental method is the one that enables most accurate results for the scientific researches as well. Because, the researcher performs a number of comparable processes, then examines the effects of these processes, and it is expected that researches conducted in this way lead the researchers to the accurate results and interpretation (Buyukozturk et al., 2008).

Sample

The target population of this study is composed of students attending to the 6th grade of Primary Education in the Fatih town of the Istanbul province, and the accessible population is composed of the 6th grade students attending to the Yunus Emre Primary School located in the Fatih town of the Istanbul province, and the sample is composed of the students attending the 6/C and 6/G classrooms of the Yunus Emre Primary School located in the Fatih town of the Istanbul province. Experimental group and control group of sample had been chosen by considering accessibility to the groups

Data Collection

The data collection tool of the environmental attitude scale developed by Uzun and Saglam (2006) as used to collect the data required for attainment of the purpose of this study. The coefficients of internal consistency attitude scale used in this study are Alpha value $\alpha = .866$, Guttman value S =.834, Spearman Brown value B=.750. According to these values, the internal consistency coefficient of the instrument is very high.

The environmental attitude scale was applied twice as pre-attitude scale and post-attitude scale to the experimental and control groups.

Analysis of Data

Data obtained from the environmental attitude scale were transferred to the computer environment and the frequencies were determined through statistical software, and they were interpreted by utilizing the relevant literature.

Findings

In this section of the study, the data obtained from the environmental attitude scale were presented in tabular form and interpreted.

Table 1.

t-Test Results of The Pre-Tests that Applied to Students Who Were in Experimental and Control Groups

Group	*n*	*X*	*SS*	*Sd*	*t*	*p*
Experimental	30	66.63	24.49	58	1.138	.891
Control	30	67.53	25.98			

It was determined that there isn't any statistically significant differences in terms of environmental attitude between two groups based on the "environmental attitude scale" that was applied to the experimental and control groups prior to the commencement of the application. As it can be seen in the Table 1, the average of the pre-attitude scores of the experimental group is 66.63, and of the control group is 67.53. Based on this finding, it can be said that that there is a small difference in favour of the control group in the results of the pre-attitude scale. However, the results of the independent groups t-test showed that the difference was not statistically significant ($t_{(58)}$=1.138; p>0.5). According to this finding, it can be said that the groups are equal in terms of the score received by them from the "environmental attitude scale".

As it can be seen in Table 2, the arithmetic mean of the post-attitude scores of the experimental group is 108,90, while it is 78,63 for the control group. These data show that the average of the post-attitude scores of the experimental group is higher than the scores of control group. This difference between two groups is statistically significant ($t_{(58)}$ =7.743, p<.01).

Table 2.

t-Test Results of The Post-Tests that Applied to Students Who Were in Experimental and Control Groups

Group	*n*	*X*	*SS*	*Sd*	*t*	*p*
Experimental	30	108.90	6.04	58	7.743	.000
Control	30	78.63	20.53			

These findings show that teaching supported with case-based learning method improves students' attitude towards the environment when we compared it to teaching based on the existing curriculum. It can be said that dealing with the environmental issues in case studies used in classroom is effective in achievement of this result. Because, the environmental attitude scores of the students belonging to the control group, in which environmental issues were not dealt with, are lower when we compared it to those scores of the experimental group.

Table 3.

Independent Sample t-test Results of The Pre-tests and Post-tests that Applied to Students Who were in Experimental Group.

Experimental Group	*n*	*X*	*SS*	*Sd*	*t*	*p*
Pre-Attitude	30	66.63	24.49	29	8.790	.000
Post-Attitude	30	108.90	6.04			

As it can be seen in the Table 3, the arithmetic means of the pre-attitude scores of the experimental group is 66,63, while it is 108,90 for the post-attitude scores of the same group. These data show that the arithmetic means of the post-attitude scores of the experimental group is quite high when we compared it to the arithmetic means of the pre-attitude scores. This difference between the arithmetic means of the pre-attitude and post-attitude scores of the experimental group is statistically significant ($t_{(29)}$=8.790; p<.01). According to this finding, it can be said that primary education supported with case-studies improves students' attitude towards the environment.

Table 4.
Independent Sample t-test Results of The Pre-tests and Post-tests that Applied to Students Who Were in Control Group

Control Group	*N*	*X*	*SS*	*Sd*	*t*	*p*
Pre-Attitude	30	67.53	25.98	29	1.704	.099
Post-Attitude	30	78.63	20.53			

As it can be seen in the Table 4, the arithmetic means of the pre-attitude scores of the control group is 67.53, while it is 78.63 for the post attitude scores of the same group. These data show that the arithmetic means of the post-attitude scores is higher than scores of the pre-attitude scores. However, this difference is not statistically significant ($t_{(29)}$=1.704; p>.05) according to the results of the t-test that applied to determine the difference. Based on this finding, we can say that teaching based on the existing curriculum does not have a significant effect on students' attitude towards the environment. The data presented in Table 2 also supports this result.

Table 5.
Pre-environmental Attitude point scores of experimental group students in the context of gender

Gender	*N*	*X*	*SS*	*Sd*	*t*	*P*
Female	17	66.17	24.44	29	2.587	.910
Male	13	67.23	25.53			

As it can be seen in the Table 5, the arithmetic means of the pre-attitude scores of the female students belonging to the experimental group is 66.17, and that of the male students is 67.23. These data show that the arithmetic means of the pre-attitude scores of the male students is higher than the scores of the female students. However, this difference is not statistically significant ($t_{(29)}$=2.587; p>.05) according to the results of the t-test that applied to determine the difference between the arithmetic averages of the male and female students. Based on this finding, it can be said that there isn't any difference between male and female students in the context of attitudes towards the environment prior to the application.

Table 6.
Post-environmental attitude point scores of experimental group students in the context of gender

Gender	*n*	*X*	*SS*	*Sd*	*t*	*p*
Female	17	108.41	6.73	29	.499	.622
Male	13	109.53	5.20			

As it can be seen in the Table 6, the arithmetic means of the post-attitude scores of the female students belonging to the experimental group is 108.41, and that of the male

students is 109.53. These data show that the arithmetic means of the post-attitude scores of the male students is higher than scores of the female students. However, this difference is not statistically significant ($t_{(29)}$=.499; p>.05) according to the results of the t-test applied to determine the difference between the arithmetic means of the post attitude scores of the male and female students. Based on this finding, it can be said that teaching supported with case studies has an effect in same level on male and female students' attitudes towards the course and the environment.

Discussion

In this study, it has been concluded that using case-based learning method in social studies course positively improves students' attitudes towards the environment.

Based on the results obtained from this study, it has been seen that teaching supported with case-based learning method positively influenced students' attitudes towards the environment. This finding of the study is consistent with the results of the studies conducted by Erten (2003), Ugur (2007), Horne and Thompson, (2008) and Çakır (2002). These studies, in which the experimental model was used, also concluded that the case-based learning method made positive contributions to students' attitudes towards the environment.

It can be said that the case-study method should be used effectively in learning-teaching processes to improve the environmental awareness of students, due to the fact that it has been determined as a result of this study and similar studies conducted with the experimental model that case-based learning method positively increases students' attitudes towards the environment in a statistically significant way. Thus, students can become more aware about the environmental issues. Furthermore, some objectives of the social studies course can be achieved more effectively and, objectives of this course also include improvement of environmental awareness of students towards the environmental issues.

When the literature is examined in terms of the case-study method, it is indicated that this method made contributions to development of students' emphatic, creative, critical, analytical and reflective thinking, problem-solving and decision-making skills and increased the responsibility, solidarity, participation, cooperation, respect, and value levels of students. This characteristic of the method is also supported by the results of studies conducted by Herreid (1994), Ugur (2007), Whitenack, Knipping, Coutts and Standifer (2000). Therefore, it can be stated that using case-study method in social studies course would make positive contributions to objectives of the course and, the skills and values which make contributions, are the focal concepts of the social studies course. In this context, the discussion can be concluded as follows:

The case-study method can be used to:

a) enable students to develop a positive attitude towards the environment in the Social Studies Course, and
b) increase students' levels of knowledge, values and skills by means of the Social Studies Course.

Because, both this study, and the other similar studies show that case-study method enables achievement of the aforementioned objectives.

♦ ♦ ♦

References

Adalı, B. (2005). "*Effects of Use of Case-Based Learning Method in Teaching the Subjects of "Viruses, Bacteria, Fungi, and Protists" in the 5th Grade Science Course of the Primary Education on Students' Academic Achievement and their Attitude towards the Science Course.*" Unpublished Postgraduate Thesis. Mustafa Kemal University Institute of Social Sciences.

Alım, M. (2006). "*Environment in Turkey and Environmental Education in Primary Education in the Process of European Union Membership.*" Kastamonu Journal of Education, 14 (2), 599–616

Aydın, M. Z. (2007). *Methods in Religious Education*. Ankara: Nobel Publication & Distribution.

Bilen, M. (2002). *Teaching from Planning to Application*. Ankara: Anı Publishing.

Bozkurt, O., Cansüngü, K. Ö. (2002). *"Misconceptions of Primary Education Students about the Greenhouse Effect in Environmental Education"*, Journal of Hacettepe University Faculty of Education (issue # 23, pp.67–73).

Budak, B. (2008). *"Place of Environmental Education at Primary Education Institutions, and Implementation Operations"*. Ege University Institute of Science & Technology Unpublished Postgraduate Thesis.

Büyüköztürk, Ş., Çakmak, Ebru K., Akgün, Özcan E., Karadeniz Ş. And Demirel Funda. (2008). *Scientific research methods.* Ankara: Pegem Akademi.

Demirel, Ö. (2002), *From Theory to Application: Curriculum Development in Education,* Ankara: Pegem A Yayıncılık

State Planning Organization (DPT) (1996). *Seventh 5-Year Development Plan, 1996–2000*. Ankara: DPT Publication.

Çakır, Ö. (2002), "*Development, Application and Evaluation of a Case-Based Teaching Method for Science Education"*. Ankara: Middle East Technical University Institute of Social Sciences, Doctorate Thesis.

Erdoğan, G. (2007). "*Effects of Project-Based Learning on Students' Learning the Global Warming in Environmental Education"*. Unpublished Postgraduate Thesis. Zonguldak Karaelmas University. Institute of Social Sciences, Department of Education Programs.

Erten, S. (2003). *A Teaching Method Aimed at Raising 5th Grade Students' Awareness About "Reduction of Wastes"*. Journal of H.U. Faculty of Education, (Sayı.25, s.94–103).

Hassan, A., Juahir, H. and Jamaludin, N. S. (2009). *"The Level of Environmental Awareness Among Students to Fulfill the Aspiration of National Philosophy of Education"* American Journal of Scientific Research ISSN 1450-223X Issue 5 (2009), pp.50-58, © EuroJournals Publishing, Inc. 2009. http://www.eurojournals.com/ajsr.htm

Horne, M. and Thompson, Emine M. (2008). "*The Role of Virtual Reality in Built Environment Education*" Journal for Education in the Built Environment*, Vol. 3, Issue 1, July 2008 pp. 5-24 (20)ISSN: 1747-4205 (Online)5 Copyright © 2008 CEBE*

Karasar, N. (2000). *Scientific Research Method.* Ankara: Nobel Publishing.

Keleş, Ö. (2007) "*Application and Evaluation of Ecologic Footprint as an Environmental Education Tool for Sustainable Life"*. Unpublished Doctorate Thesis.

Küçükahmet, L. (2006). *Principles and Methods of Teaching*. Ankara: Nobel Publication & Distribution.

Sönmez, V. (1994) *Social Studies Teaching* Ankara: Pegem Publishing

Taşdemir, M. (2000). "*Planning and Evaluation in Education"*. Ankara: Ocak Publishing.

Uğur, A. (2007). "*An Action Research: Effects of Use of Case-Study Technique in Constructivist Social Studies Teaching on Students' Emphatic Thinking Skills"*. Marmara University Institute of Educational

Sciences Department of Primary Education, Department of Social Studies Teaching, Unpublished Postgraduate Thesis.

Ünal, S. Dımışkı, E. (1999) *"Development of Environmental Education under the Aegis of UNESCO-UNEP and Environmental Education in Secondary Education in Turkey"*, Hacettepe University Journal of Faculty of Education, (Issue #.16–17, pp.142–154).

Yazıcıoğlu, Y. and Erdoğan, S. (2004). *"SPSS applied scientific research methods"*. Ankara: Detay Publishing.

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 123-132.

Çevreye Yönelik Öğrenci Tutumları Üzerine Sosyal Araştırmalar Durum Çalışması Yöntemi Kullanımının Etkileri*

Hamza AKENGİN**
Marmara University, Istanbul, Turkey

Gökhan AYDEMİR
Basaksehir Ensar College, Istanbul, Turkey

Özet

Bu çalışma Sosyal Bilimler "Ülkemizin Kaynakları" ünitesini durum çalışması ve öğrenme temelli öğrenen 6. Sınıf öğrencilerinin akademik başarıları ve tutumları arasında anlamlı bir fark olup olmadığını bulmayı hedeflemiştir. Ayrıca öğrenme-öğretme destekli durum çalışması hakkında öğrencilerin düşünce ve duygularının sunulması amaçlanmıştır. Çalışmada öntest-son test kontrol gruplu desen kullanılmıştır. Çalışmaya 2008-2009 öğretim yılı ilköğretim altıncı sınıfa giden 30 öğrenci deney grubuna seçilmiş, 30 öğrencide kontrol grubunu oluşturmuştur. Çalışma sırasında, ön başarı testi ve ön tutum ölçeği ilk deney ve kontrol grubuna uygulanmıştır ve uygulama süreci bundan sonra başlamıştır. Bu süreçte ön test ve ön tutum testi puanları açısından gruplar arasında anlamlı bir fark olmadığı tespit edilmiştir.

Anahtar Kelimeler: Durum çalışması, sosyal çalışmalar, çevresel, öğrenci tutumları

* Bu çalışma, Marmara Üniversitesi Eğitim Bilimleri Enstitüsü'nde yürütülen "Çevreye Yönelik Öğrenci Tutumları Üzerine Sosyal Araştırmalar Durum Çalışması Yöntemi Kullanımının Etkileri" başlıklı tezden üretilmiştir.

** Hamza AKENGİN, Marmara Üniversitesi, Atatürk Eğitim Fakültesi, Göztepe, 34722/ Kadikoy/Istanbul, Türkiye. Telefon: +905372025851 Fax:+902163388060 E-mail: hamzaakengin@yahoo.com ve hakengin@marmara.edu.tr

ISSN: 2146-0329

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 133-153.

Integration of Distinct Educating Spaces and Their Potential for a More Comprehensive Environmental Education Work

Valéria Ghisloti Iared*
Federal University of São Carlos, Brazil

Haydée Torres de Oliveira
Federal University of São Carlos, Brazil

Received: January 2012; Revised: May, 2012; Accepted: June 2012

Abstract

To investigate if the units of the São Carlos Ecological Pole (São Carlos, São Paulo, Brazil) are educating spaces that may contribute to the understanding of the complexity of environmental issues and stimulate a sense of belonging and social responsibility, we interviewed primary school teachers who had accompanied visits to these places and members involved with environmental education in these spaces, and followed guided tours in all units of the Ecological Pole. We have identified that the activities can address issues that espouse the three dimensions of educational practice: cognitive (knowledge), subjective (feelings, principles, ethics) and political. No site alone is able to espouse all parameters considered essential in a valid environmental education work, but considering their sum, we identified that all of them are taken into account. Therefore, we reinforce the idea that the integration of these units would yield a more thorough EE work.

***Keywords*:** educating spaces, urban natural areas, educational practice dimensions, outdoor activities, critical environmental education.

Introduction

Background Information

The São Carlos Ecological Pole aims to integrate environmentally relevant administrative units in order to jointly conduct an effective and contextualized work of diffusion of environmental education (EE), constituting an ecological corridor between their natural areas. These units are located in urban areas in the city and provide an opportunity for residents and visitors to connect with the natural environment. The units comprise the local Zoo, the Municipal Botanical Gardens, which include a plant nursery and ecological trail, the

* Valéria Ghisloti Iared, Federal University of São Carlos, Tiradentes, Street 527 / São Carlos, SP, Brazil/ ZIP code: 13560-430, Phone: 55 16 34126094, valiared@gmail.com.

ISSN: 2146-0329

Municipal Organic Vegetable Garden, the municipal utility of Espraiado (water extraction station), an experimental farm and a nature trail inside a public university. These units are run by the municipal and federal government and a municipal utility. All EE activities are currently performed in an independent fashion, without benefiting form of a common program of environmental education that could exploit the complementary character of the work. Therefore, the São Carlos Ecological Pole was signed into agreement in June 2010, with the main aim of integrating the various existing educational initiatives, in order to develop a coordinated environmental education work. The present research aims to evaluate if the units of the São Carlos Ecological Pole are educating spaces, and if the environment education work developed has contributed to the understanding of the complexity of environmental issues and stimulated a sense of belonging and social responsibility.

Critical environmental education

We consider it important to clarify what EE we are talking about and working with. According to Acserald (2008), since the beginning of the environmental movement, a utilitarian and a cultural view dispute the scenario.

> The two approaches outlined here correspond to two models of strategic action. The utilitarian approach has led to the so-called ecological modernization strategy, with its emphasis on market, technical progress and political consensus. (…) In contrast, the cultural approach has given rise to protest action seeking to overturn the unfair distribution of environmental benefits and harm. Since social injustice and environmental degradation have the same origin, there is therefore a need to change the way in which power over environmental resources is distributed – unfairly- and to take away from those in the power the ability to transfer the environmental costs of development to the most dispossessed (Acserald, 2008, p. 88).

Mohai and Bryant (1998) use the Theory of Environmental Deprivation to explain the unequal distribution of resources and environmental damage. According to this theory, first hand experience of adverse environmental impacts lead us to a greater concern with the issue. Thus, urban residents are more concerned about environmental problems than rural residents, just by being in contact with environmental conditions of degradation. According to the authors, this theory can be applied to ethnic differences. African Americans are more concerned about environmental impacts than white Americans, because of the uneven pattern of localization of their homes.

The movement that the authors Acserald (2008) and Mohai and Bryant (1998) refer to is called environmental justice. Currently, many environmentalists are concerned with public policies and actions aimed at profound changes in society, since environmental issues require rethinking our current development model. That means, the search for sustainability goes beyond technical issues and technology improvement. Working whithin this more complex view of the environmental problem, means to work in a critical perspective of EE.

Urban green areas

The earliest records of natural areas preservation come from Eastern peoples motivated by religious factors. In Europe, the preservation of natural areas was based on the idea of protecting wildlife for the exercise of hunting by a rich and powerful social class (Diegues, 1996; Milano, 2000; Phillips, 2004). In the nineteenth century, the advance of Natural History, Romanticism and the Industrial Revolution helped to change this scenario. City life had become unhealthy and degrading, and rural life was idealized by the proletariat (Diegues, 1996; Milano, 2000). According to these authors, it is in this context of American

capitalism* and accelerated urbanization that movements intended to protect nature for recreational use from the urban population emergence. The protected areas were "regarded as 'islands' of great beauty and aesthetic value that led the man to the contemplation of the wonders of unspoiled nature" (Diegues, 1996, p. 24).

Today, international agreements and laws in many countries worldwide are related to the protection of natural areas. Particularly in Brazil, we have the Forest Code (Law No. 4771 of September 15, 1965) and the National System of Conservation Units (Law No. 9985 of July 18, 2000). However, not all of these areas are accessible to the population due to both legal aspects (some are not open to visitors) and their distance from the urban centers, since more than 80% of the brazilian population are urban (Muninet, 2008† as cited in Nicodemo & Primavesi, 2009) and can not always travel to these areas.

Urban green areas are characterized as natural or man-made, and are found in parks, forests, public spaces, alongside waterways, or private residential areas. These green spaces are the only opportunity the urban population has to be in contact with an environment closer to nature. It is precisely for these reasons that these green spaces in urban areas tend to be one of the best indicators of quality of life in cities (Benayas, Gutiérrez & Gutiérrez, 1999). Within this scenario, we advocate the creation of urban green areas and the educational use of these spaces . We agree with Tuan (1980), who believes these areas should provide an excellent opportunity for consistent educational practices, since nowadays the contact with the natural environment is restricted to certain times and only takes on a recreational aspect (Tuan, 1980).

> Despite the scientific advances, how much do we know about the natural environment? How many of us (and how often) stop to think that the pleasant conditions (although apparently inhospitable in some extreme regions) that exist on this planet are the foundations for the magnificent diversity of plant and animal species, many of which still unknown? Although emphasis is usually placed on biodiversity, it is known that there are also significant associations among large bodies of water, winds and weather. It should be emphasized that all these systems are interrelated and interdependent. (Lestinge, 2004, p.38).

The São Carlos Ecological Pole can be considered one of the relevant areas to the local population. The units are located in an urban area and contain natural and reforested environments. As previously mentioned, educational activities that have been going on in these spaces (although they are isolated) contribute significantly to the regional EE.

In Brazil, from the mid-1970s, a number of proposals have incorporated educational activities related to environmental issues as extra-class activities (Mendonça, 2003). According to Peralta (2002), the set of values inherent in modern urban-industrial society has led humanity to lose contact with the primary sources of creation, such as headwaters of rivers, color of the land, rocks, aroma of foliage, the sky, the sun and fresh air. This loss of physical contact with the natural environment, due to the urban lifestyle, leads to the loss of immediate contact with the means of production in its original source (Guimarães, 1995;

* The concept of American capitalism is contextualized within the perspective of justice and environmental racism (Mohai, Bryant, 1998) discussed in the previous section. From this perspective, cultural, socioeconomic and political issues are inextricably linked to environmental problems. In this context, overcoming these challenges requires a complex and deep vision within the environmental debate.

† MUNINET. *Rede Brasileira para o Progresso Municipal.* Available at: <http://muninet.org.br/banco/index.php?g_cod_hierarquia=1&newVisualizacaoID=5>.

Peralta, 2002). As such, "the outsourcing of food can produce the illusion that life springs inside a supermarket" (Peralta, 2002, p. 116).

However, a tendency towards returning to nature can be perceived in several ways, such as practices that use interpretive paths or trails in natural areas as an educational strategy to integrate the human being with nature (Tabanez, Padua, Souza, Cardoso, Garrido, 1997; Robim & Tabanez, 1993). Seniciato and Cavassan (2003) believe there is consensus among researchers who study the relationship between humans and nature on the environmental interpretation representing a relevant strategy to integrate people´s knowledge and subjective aspects. The exploration and discovery through interpretation of new interactions and interrelationships during the ecological and psychological journey in a trail, in both natural and built environments, involve feelings, information, narratives, evocations, uses, meanings and associations (Lima, 1998). The author asserts that the affective (represented by the feeling or emotional experience and learning) and cognitive (represented by the activity of the mind to understand an object, intellectual functioning) aspects are so integrated that the experience transcends the moment in which the path is being driven.

Dorado, Arias, Alonso, Maldonado (2002) reported that many experiences dealing with large-scale environmental problems (ozone layer, greenhouse effect, etc.) may incur in passive attitudes because they seem so distant. EE activities in urban green areas have the advantage of approximating the population and the local reality. According to the authors, this approach seeks to establish an emotional bond and the perception that we can participate in local decisions (Dorado *et al*., 2002). They also see the nature contact activities as a possibility for effective teaching because they raise interest and attention, allowing entering any area of knowledge: physics, geometry, health, among others.

However, Pacheco - Muñoz (2002) pointed out that in many of these places the environmental education is centered on nature, and does not deal with the complexity of the issue. For this author, these spaces have not become a symbol of collective identity and community action, and it is essential that they generate new means of struggle in defense of nature and a fairer society:

> (...) it is necessary to include topics, such as extinction or aspects of biology, ecology and natural history, causes and social consequences of the loss of biodiversity, biotechnology, environmental services, indigenous knowledge, and relationships with causes and consequences of other environmental problems, within different levels and plans (political, economic, social and cultural). Our themes can be extended and we can articulate other knowledge and learnings, explore veins on aspects of law, order, impact, environmental health and safety, traditional knowledge, etc., which have been forgotten by the programs or activities of the centers and environmental culture. (Pacheco-Muñoz, 2002, p. 66).

González-Gaudiano (2002) also showed concern for the different EE pedagogical discourses. The author believes that the management of biodiversity is a complex issue and requires the mobilization of people in individual and collective levels. This perspective goes side by side with the discourse of a critical environmental education. This concern is present in the research conducted by Fracalanza (1992) and Manzochi (1994), who find that the concepts in Ecology are treated in a disconnected manner in both textbooks and classrooms. Manzochi (1994) extended her studies to extra-class activities, in which this trend was the same. Moreover, these studies found that despite the issues and activities having the potential to generate discussion, the cases raise no debate addressing the ethical dimension and citizenship.

Other authors have argued about the relationship among cognitive (knowledge), subjective (feelings, principles, ethics) and political education for a real EE work (Carvalho *et al*., 1996, 2006; Guimarães, 2004; Tristão, 2005, among others).

Based on a review of the literature performed to date and our experience in working with nature trails, we have found that most activities in these areas do not benefit from their entire educational potential, both regarding the contribution that ecology can offer and working towards the formation of values and social mobilization. In this sense the present work is justified by the need to overcome the challenge of focusing only on informative / ecological aspects in the environmental education work developed in the São Carlos Ecological pole Units.

In this research, we sought to understand how the knowledge, ethical and aesthetic values, and political participation related to environmental issues can be addressed in a coordinated way, in places where there is a tendency to discuss mostly the ecological aspects.

Method

Ecological Pole[‡]

São Carlos is a municipality in the state of São Paulo that stands out regionally for having, among other things, two public universities, an experimental farm of the Brazilian Enterprise for Agricultural Research and a track record in environmental education, the result of partnerships among various local institutions. It is within this history characterized by strong advocacy and articulated work that, in 2002, the São Carlos City Hall idealized the "São Carlos Ecological Pole" project . The idea was to integrate the various environmental education activities under development in the different units.

The Municipal Botanical Garden "Navarro de Andrade", which includes a plant nursery and an ecological trail, was founded in 1953 to produce seedlings for trees and gardens in public areas. The ecological trail, opened in 2004, is a small 350-meter path meandering through an area where patches of seedlings have been planted for over 30 years. This unit receives two types of visits: monitored field trips, which are considered environmental education activities with the presence of approximately 400 students a month, and people who come in search of urban trees and seedlings for reforestation, recording a monthly average of 190.

The Municipal Organic Vegetable Garden produces vegetables without using pesticides or fertilizers. There is a composting pile on the site, and the educational work is based on the importance of this practice and the consumption of healthier foods. In this area there are water tanks that supply their own water necessities, which helps demonstrating the importance of water resources conservation. The organic garden is also being structured to produce and supply medicinal plants. The Garden receives school field trips. The educational work is based on the practice and knowledge of organic gardening, medicinal plants and techniques for composting waste, essential activities for environmental education.

The Municipal Zoo, called São Carlos Ecological Park (PESC) “Dr. Antonio Teixeira Viana”, occupies an area of 64 hectares, composed in part of cerrado, also known as brazilian savanna and in part of gallery forest. Half of this area is a preserved watershed.. The main objective of the Zoo is the ex situ conservation of South America fauna; it contains a

[‡] Excerpt adapted from " São Carlos Ecological Pole - Broadcast Centre in Environmental Education" sent the notice of Fuzzy Fund Law in April 2009.

collection of nearly 630 specimens of animals of more than 93 different species, many of which are endangered. It also has an environmental education center that receives schools and other visitors from São Carlos and neighboring cities.

The Water Station, called "Espraiado", belongs to a municipal utility: the Autonomous Water and Sewage Service (SAAE), responsible for water extraction, treatment and distribution and sewage collection and treatment in São Carlos. This station is one of the city´s two surface water extraction places. It is considered an important place to develop work in environmental education. As it is easily accessible and located close to the urban area, it allows exploring issues related to water resources protection and quality and quantity of drinking water for human consumption maintenance.

Founded in 1968, the Federal University of São Carlos (UFSCar) is the only federal institution of higher education located within the State of São Paulo. One of its particularities is the existence of a rural area which is a privileged place for the development of educational activities focused mainly on environmental issues. This space includes 223 ha of natural area (185 ha of cerrado, 3 ha of riparian forest and 35 ha of reforested area) which houses a spring, a lagoon, a stream and neighborhoods with a strong human influence. In this context, professors of the UFSCar Botany department have created the extension project "Guided visits to the Nature Trail" The objectives are to raise awareness on the importance of conserving the environment through guided visits to the cerrado area and contribute to the formation of university students, sharing the knowledge generated in the university with the local community. In this research we consider only the education space of the Nature Trail, but it is noteworthy that there are other locations within the university which can be exploited.

The experimental farm, called Embrapa Livestock Southeast, is a research unit of the Brazilian Agricultural Research (Embrapa), a federal agency, and was established in 1975. The research programEmbrapa Cattle-Southeast includes the areas of beef cattle, dairy cattle, equine and forage crops. The physical area of Embrapa comprises 2,668 ha of which 970 ha are natural reserves (cerrado and rainforest) and nature trails are guided in these locations. Another feature of the Embrapa is the presence of more than 90% of watershed in its lands.

Data Collection

In August 2008 we sent a questionnaire to all teachers who had students in the 06-10 years-old range in the São Carlos municipal schools, and at one private school. Our goal was to have a first approach to present our research and invite them for an interview. Therefore, the teachers who accepted the invitation had the option to provide a contact so that we could look for them. From November 2008 to June 2009, 25 such teachers granted us interviews (Appendix A).

We also contacted all units of the Ecological Pole to invite those responsible for EE in each educating space for an interview. So, during the first half of 2009, we also interviewed two people of the Municipal Zoo, three participants in the university´s Nature Trail, three workers of the Municipal Organic Vegetable Garden, three of the Municipal Botanical Garden, three of the Embrapa farm and one of the Water utility SAAE (Appendix B).

From March to October 2009 we followed monitored visits to São Carlos Ecological Pole units. Whenever possible, we followed a visit with a group of youngsters and an adult group in each unit. We observed two visits per unit which were recorded in a field notebook. In this field notebook, we took note of the issues discussed at each stopping point of the trail.

During the observations we sought data on the spheres of knowledge, ethical and aesthetic values and participation in accordance with the work of Carvalho *et al*. (1996) and Carvalho (2006). The author considers three basic dimensions for formation in environmental issues: 1) the dimension related to the nature of knowledge, 2) the dimension related to ethical and aesthetic values, 3) the treatment given to the possibilities of political participation of the individual. We used semi-structured interviews and recorded field observations covering these three areas of educational practice.

Data Analysis

The use of multiple sources of evidence allows the researcher to study a wide margin of angles of the same phenomenon. But more important is the development of converging lines of inquiry for analyzing these data. It is recommended that a process of triangulation be used (Patton, 1990). Therefore, the validity of the research is resolved because a variety of sources shows the multiple angles of the same phenomenon.

To organize and analyze the data we followed Moraes' proposal (2003, 2005)- a discursive textual analysis. According to the author, this type of analysis has been used in EE qualitative research. Thus, interviews and field records were subdivided into units of analysis and we performed the triangulation of these units of analysis. We grouped all the elements identified as similar, which we call data points. These data points comprehended in all suggestions and potential activities identified in all interviews and research observations.

The issues raised were classified based on the criteria proposed by Marpica (2008), which are organized according to the dimensions of knowledge, ethical and aesthetic values, and participation proposed by Carvalho *et al*. (1996) and Carvalho (2006), as shown in Table 1:

Table 1.

Parameters of EE practice according to a critical view (Marpica, 2008).

Dimensions	Parameters	Symbol
Knowledge	1.1. Concepts are presented, discussed and experienced in ways that contribute to the systemic view.	C1
	1.2. Interdisciplinary / transversality is valued in the production and systematization of knowledge.	C2
	1.3. Local knowledge is considered valid / Scientific knowledge is not absolute.	C3
	1.4. Investigative attitude during the process of knowledge construction.	C4
	1.5. Historical, social, economic and environmental themes are contextualized. The environmental situation is a historical, social and cultural result.	C5
	1.6. Science and technology are discussed in relation to positive and negative impacts, they are not placed as a solution or a problem.	C6
	1.7. Consideration of country's cultural and natural diversity.	C7
Ethical and aesthetic values	2.1. Human-nature interaction: complex relationship, human being belongs to the web of social, natural and cultural relationships and lives in interaction.	V1
	2.2. Conflict: controversial issues are presented from various perspectives.	V2

Table 1. *(Cont.)*

	2.3. Discussion on differences in the access to elements of nature and distribution of environmental risks.	V3
	2.4. Solidarity as a basis for collective work in search of environmental solutions.	V4
	2.5. Point of view presented in an argumentative way.	V5
	2.6. Use of elements that enable interaction, participation and satisfaction.	V6
	2.7. Use of aesthetic elements that arise the awareness of the environmental issue.	V7
Participation	3.1. Discussion on the legislation related to the environmental content. Discussion includes the relevance of the legislation.	P1
	3.2. Responsibility of various social segments (civil society, governments, non-governmental organizations - NGOs, private companies, etc.).	P2
	3.3 The solutions of environmental problems are sought on a collective basis. The state is responsible for creating spaces for participation. Science and technology are valid insofar as they are democratised.	P3
	3.4. Exploitation of local potential and regional environmental strategy to motivate participation.	P4
	3.5. Education encouraging dialogue and participation.	P5
	3.6. The core issues of environmental problems have to be addressed, whether they are social or of other kind.	P6
	3.7. Participatory citizenship.	P7

Results and Discussions

We could assign more than one parameter for each identified aspect. We counted the number of notes for each dimension considered (independent or associated, ie, when the dimension of knowledge appears alone, or associated with values, participation, values and participation, and so on). Then we calculated the percentage of points raised for the following subdivisions: knowledge, values, participation, knowledge + values, knowledge + participation, values + participation knowledge + values + participation. We also decided to check the frequency of each parameter and build a table showing the percentage of notes of the 21 parameters proposed. After the systematization of data, *metatexts*, in table format, were interpreted and we started the final stage of theorizing study according to Moraes (2003, 2005).

From the number of parameters assigned to each point raised, we built two tables: Table 2, which presents the frequency of the dimensions addressed, and table 3, which shows the frequency of each parameter identified in the issues raised in the Ecological Pole's units. The percentage in the *Total* column shows the total number of events considering all units of the Ecological Pole. In other words, the sum of all the notes for the dimension or parameter addressed.

Table 2.

Frequency of the dimensions addressed in all aspects raised in the São Carlos Pole Ecological's units.

	Percentage of occurrences identified						
Dimensions addressed	Nature Trail	Organic Garden	Water Capture Station	Zoo	Experimental Farm	Botanical Gardens	Total
Knowledge	23,5%	15%	9%	12%	17%	29%	19,5%
Values	12%	5%	0%	15%	0%	10%	9%
Participation	0%	5%	0%	2%	0%	2,5%	2%
Knowledge +Values	41%	30%	18%	51%	28%	29%	36, 5%
Knowledge + Participation	3%	5%	27%	5%	22%	2,5%	7%
Values + Participation	3%	0%	9%	5%	11%	5%	5%
Knowledge +Values + Participation	17,5%	40%	37%	10%	22%	22%	21%

Legend:Dimension that received the largest number of notes. Dimension that received the smallest number of notes.

Table 3.

Frequency of each parameter identified in the issues raised in the São Carlos Ecological Pole's units.

	Percentage of the parameters identified in the issues raised.						
Parameters of the dimensions.	Trail of Nature	Organic Garden	Water Capture Station	Zoo	Experimental Farm	Botanical Gardens	Total
C1- Concepts are presented, discussed and experienced in ways that contribute to the systemic view.	19%	19,2%	17,5%	21,7%	15,8%	18,2%	19%
C2 - Interdisciplinary / transversality is valued in the production and systematization of knowledge.	4,5%	6,9%	0%	1,9%	8,9%	6,6%	5%

Table 3. *(Cont.)*

C3- Local knowledge is considered valid / Scientific knowledge is not absolute.	3,5%	5,5%	0%	4,7%	3,5%	4,1%	3,5%
C4 - Investigative attitude during the process of knowledge construction.	8%	2,7%	10%	2,9%	1,7%	1,7%	4,2%
C5 - Historical, social, economic and environmental themes are contextualized. The environmental situation is a historical, social and cultural result.	6%	5,5%	7,5%	7,5%	5,3%	8,3%	7%
C6 - Science and technology are discussed in relation to positive and negative impacts, they are not placed as a solution or a problem.	3,5	6,8%	5%	4,7%	7%	3,3%	4,8%
C7 - Consideration of country's cultural and natural diversity.	0%	1,4%	2,5%	6,6%	0%	4,1%	2,8%
V1 - Human-nature interaction: complex relationship, human being belongs to the web of social, natural and cultural relationships and lives in interaction.	3%	8,2%	7,5%	11,3%	7%	6,6%	6,6%
V2 - Conflict: controversial issues are presented from various perspectives.	3,5%	4,1%	5%	0,9%	7%	3,3%	3,6%
V3 - Discussion on differences in the access to elements of nature and distribution of environmental risks.	1%	1,4%	2,5%	0%	1,7%	0,8%	1%
V4 - Solidarity as a basis for collective work in search of environmental solutions.	1%	2,7%	7,5%	1,9%	3,5%	0,8%	2,2
V5 - Point of view presented in an argumentative way.	3%	0%	0%	1,9%	0%	2,5%	1,6
V6 - Use of elements that enable interaction, participation and satisfaction.	13%	8,2%	5%	11,3%	1,7%	7,4%	8,8%
V7 - Use of aesthetic elements that arise the awareness of the environmental issue.	14,5%	4,1%	0%	6,6%	3,5%	7,4%	7,4%

Table 3. *(Cont.)*

P1 - Discussion on the legislation related to the environmental content. Discussion includes the relevance of the legislation.	1%	4,1%	2,5%	1,9%	10,5%	5%	3,8%
P2 - Responsibility of various social segments (civil society, governments, non-governmental organizations - NGOs, private companies, etc.).	3,5%	8,2%	12,5%	2,9%	3,5%	1,7%	4,4%
P3 - The solutions of environmental problems are sought on a collective basis.	3,5%	5,5%	7,5%	2,9%	8,9%	5,8%	5,2%
P4 - Exploitation of local potential and regional environmental strategy to motivate participation.	4 / 3,5%	2 / 2,7%	1 / 2,5%	7 / 6,6%	4 / 7%	10 / 8,3	28 / 5,6%
P5 - Education encouraging dialogue and participation.	2%	1,4%	2,5%	0%	0%	0%	0,8
P6 - The core issues of environmental problems have to be addressed, whether they are social or of other kind.	0%	0%	2,5%	0,9%	0%	0,8%	0,5%
P7 - Participatory citizenship.	3%	1,4%	0%	0,9%	3,5%	3,3%	2,2%

Legend: Parameter that received the largest number of notes

Parameter that received the second largest number of notes

Parameter that received the smallest number of notes

Most of the points raised pervade the knowledge's dimension as seen in Table 2, which shows that this dimension always receives notes associated or not to other dimensions. This result can be explained by the local environment: because it is a natural area, plenty of interest is drawn in relation to the names of plants, animals that live there, procedures and techniques and the local history. This information is not often linked directly to another dimension. In our view, this is one of the challenges of environmental education. Many times we believe that the access to information means making people aware of the environmental aspect and as Mayer (1998) and Sauvé (1999) discuss, historically, knowledge about the subject has not been proven an effective strategy to environmental education work. Such a conception must be overcome as it is not conducive to deep reflection on this issue.

Table 3 shows that the parameter most worked on in the dimension of knowledge is C1 (Concepts are presented, discussed and experienced in ways that contribute to the systemic view). The perception that everything is interconnected in nature and is influenced and influences this dynamic equilibrium may arouse sensitivity to parameter V1 (Human-nature interaction: complex relationship, human being belongs to the web of social, natural and cultural relationships and lives in interaction..) So much so that it is the second most frequently cited in two locations (Municipal Zoo and Organic Vegetable Garden). This element identified in our analysis is consistent with that of Carvalho (1999):

> In an environmental education program, without doubt, the identification and description of natural components and understanding of the phenomena of nature are of fundamental importance. However, this **functional nature dimension** should be regarded as a **means** or **step** required to understand the reasons and causes of the processes of interaction present in the wild. (CARVALHO, 1999, p. 11, emphasis added).

Also in this context, parameter C3 (Local knowledge is considered valid / Scientific knowledge is not absolute.) received 3.6% of the notes. This aspect should be emphasized, because it raises the discussion on the process of scientific knowledge production. According to Carvalho (1999), it means thinking about the social influences and cultural and economic policies that guide the relationship between science and technology (equivalent to parameter C6, which received 4.6% of notes). The author concludes by saying that, as a human activity, science is subject to errors and mistakes. This element was remembered in the Nature Trail, (C3 received 3.5% of notes) in which different theories are explained and the fact that scientific knowledge is not absolute and is transformed throughout history is shown.

In a study about educational programs dealing with wildlife, Pegoraro and Sorrentino (1998) remembered the importance of knowing our species diversity in all its contexts: cultural, historical, aesthetic and scientific. These issues should involve cognitive and affective situations and must allow a reflection on the lifestyle of modern societies. The authors stated that the lack of contact with our biodiversity reduces our understanding about what their extinction means affecting the way we position ourselves to face facts.

As shown in Tables 2 and 3, many of the issues raised can include more than one dimension at a time, so that in two places (Organic Vegetable Garden and Water Station), the largest number of themes permeates the three dimensions. In the final summation, the percentage of subjects that address the three dimensions (21%) is also significant, bringing up the idea that the subjects involve more than one issue, which is consistent with our view that it is up to EE to unveil the complexity of environmental issues.

In this sense, Pegoraro and Sorrentino (1998) worry about some works that have a linear conception by combining monitoring, legislation and education. The authors criticize such a perspective and argue that we should have a more complex approach in educational practice, permeating the different dimensions, fact observed at the São Carlos Ecological Pole.

According to Table 2, the dimensions of values and knowledge are associated in 36.5% of subjects. This result may be due to the fact that information should usually be linked to aesthetic or curious aspects, which arises the sensitivity and satisfaction about nature. Therefore, there are many notes to V6 (Use of elements that enable interaction, participation and satisfaction) and V7 (Use of aesthetic elements that arise the awareness of the environmental issue.) in Table 2. Krasilchik (2004) suggests a link between cognitive and aesthetic sightseeing. It is important to highlight that parameter V7 is the second most reported in the Nature Trail. Indeed, during observations and interviews, we realized how relevant this aspect is to the monitors, since cerrado has been devastated in Brazil due to the low aesthetic value assigned to it.

The sphere of participation can be significantly approached, since several parameters have received many notes: P1 (Discussion includes the relevance of the legislation.), P2 (Responsibility of various social segments.), P3 (The solutions of environmental problems are sought on a collective basis.), P4 (Exploitation of local potential and regional environmental strategy to motivate participation). In other words, the extent of

participation can be worked on at various times, but it is not necessary to dwell on it on all issues raised.

The most reported parameter within the dimension of participation is exactly P4 (5.6%), and in this sense, we reinforce the importance of EE work in green areas close to the visitors´ reality. The "feeling of belonging" has high potential to arouse the "feeling-able" (Sorrentino, 2000). Furthermore, we believe that the monitor's position, who is in contact with the group at all times, contributes to the work with the dimension of values and participation. By referring to the sensitivity to nature, respect and solidarity with all forms of life, the dimension of values is being worked on. Likewise, instructional procedures that facilitate participation, collective and cooperative work are elements that contribute to the development of skills related to the process of building citizenship.

In two units of the Ecological Pole (the Organic Vegetable Garden and Water Station), parameter C4 (Investigative attitude during the process of knowledge construction) was the second most identified. This as a positive point, since there is a tendency toward discussing the complexity of the facts surrounding the environmental issues. We also advocate the collective knowledge construction is a way to pervade the ammount of participation. In a study about policies for the conservation and sustainable use of biological diversity, Andelman (2001) indicates that these factors depend on intersectoral dialogue and consensus among social, economic and political sectors, public and private segments.

In an analysis of the pedagogical potential of non-schooling education, Pivelli and Kawasaki (2005) remember the importance of these opportunities to awaken curiosity, generate questions and investigate situations. As the results of their research, the authors observed that political, economic, cultural, ethical and social aspects can integrate the aims of these activities. Non-schooling spaces can be explored in order to awaken affection, curiosity, raise questions and desire to contribute to local sustainability. Thus, we value parameter C4 (Investigative attitude during the process of knowledge construction), which received appointments in all units. In another investigation, Viveiro and Diniz (2005) also found motivation fundamental in field activities. We believe that such situations nourish affective feelings in relation to local biodiversity.

Lucas (1980-81)[§] as cited in Mayer (1998) discusses three pedagogical perspectives related to environmental education: education *about* the environment, education *in* environment and education *for* the environment. Robottom and Hart (1993) argue that the prospect of EE *in* the environment is for those who have proposed an interpretive vision of nature and support the development of an appreciation of the environment as an individual and personal value. In an overview, we can say that the three dimensions of educational practice have the potential to be discussed at the Ecological Pole's units. Therefore, we advocate that these natural environments or those close to natural spaces are potential educating spaces to work with a critical view of EE, which, according to Robottom and Hart (1993), agrees with the prospect of EE *for* the environment.

There is heterogeneity in relation to which parameters are addressed with more or less frequency and we believe it depends on the subject to be further explored in each location. Therefore, we reinforce the idea that the integration of these units would yield a more thorough job of EE. When we look at each site independently of each other, we realize that many parameters are not taken into account, but by analyzing their sum, we observe that all are identified. This result shows the importance of an EE that is permanent and

[§] LUCAS, A.M. (1980-81), The role of science education in education for the environment. *Journal of Environmental Educatio*n. v. 12, n. 2, p.32-37.

continuous, interdisciplinary and transdisciplinary, requiring partnerships among various agencies to be viable. The connectivity between the Pole units in a coordinated action would increase each unit's educating potencial.

There are certain parameters that still are not considered very often. Thus, we aim at an EE that is permanent and articulated with other educating spaces so that other issues, at other times, or other opportunities can be discussed and reflected upon. The field trips take place in educating spaces where several themes (or parameters of a critical EE) can be dealt with. . The classroom is another educating space, allowing several of these parameters to be potentially addressed. On the other hand, there are also other social organizations that can and should engage with these themes. Thus, we avoid the "pedagogical illusion" (Carvalho, 2006) and understand the limits and possibilities of each educating space and work towards the interaction of these various proposals.

Relevance of an Ecological Pole for EE activities

From the data analysis, we have found EE activities that are integrated and articulated in different educating spaces can address issues that permeate the three dimensions of educational practice (knowledge, ethical and aesthetic values and participation). The subjects raised in these educating spaces involve social, ethical, aesthetic, cultural, historical and biological issues. The clarification of all these issues contributes to the understanding of how environmental issues are complex and, therefore, environmental education in natural spaces should be valued for a critical view of EE.

This is why we argue that all these elements critically approached in the visit must be linked with the work developed in other educating spaces of the city. Thus, a first challenge arises facing proposals for field trips as a tool for environmental education: the punctual character of these activities.

In March 2009, we participated of the International Meeting for Education Applied to Conservation and Sustainability[**] organized by the Zoo of São Paulo. Several experiences of educating spaces (botanical garden, zoo, nurseries, aquarium, etc.), in which there occur educational activities about environmental issues, were presented. Also in 2009, during the VI Iberoamerican Congress on Environmental Education[††], several papers on field activities and environmental education were presented. We noticed that several experiments do not treat the visits to such places as a punctual activity. The institutions in charge are integrating field trips into a permanent program or project. In this sense, the visit becomes an essential and contextualized activity within a continuous and planned action.

Another crucial factor for the effectiveness of EE actions is the formation of responsible personnel to work with environmental education in these spaces. For all educational potential to be exploited it is necessary to allow for a debate on the educational role of these units. In fact, the first step is to enhance the educational processes that occur at these sites and include hiring professionals to take such positions. Pacheco - Muñoz (2002) suggests an institutional educational project that resembles the school curriculum by defining objectives, targets and guidelines for the development of skills, attitudes, beliefs and values. The author considers that the construction of an educational planning helps to overcome the decontextualized and naive practices by defining practical strategies for the

[**] For more details on the event schedule, visit: http://www.zoologico.sp.gov.br/encontro_internacional.htm
[††] For details about these works is necessary to access the Event's Proceedings, available only to participants. Among the works considered in this investigation, we can mention: Faggi and Perelman (2009), Bentt and Pellegrini (2009) and Lameda (2009).

activities. In addition, the plan incorporates the idea of evaluation and supervision of the educational program quality.

The present study has showed that experiences in educating spaces of an Ecological Pole can sensitize people about the complex and dynamic relationship between environment and society as well as motivate the collective participation in promoting local sustainability. However, this potential can be achieved depending upon how these spaces are structured for the educational activities undertaken in them. We believe that an effective integration of EE activities among the units will contribute to a broader and deeper approach to environmental issues. Furthermore, we hold that the Ecological Pole work in coordination with other EE initiatives in the municipality to achievement a permanent EE.

As previously mentioned, we are guided by a critical perspective of EE. Thus, we believe that cultural, social, political, economic and ethnic implications are part of the debate. Acserald (2008) calls "critical neutralization" the procedure by which we emphasize the technological adaptation to solve environmental problems. In fact, environmental degradation is not a problem of ecosystems but of how we are related to nature and each other for the appropriation of nature, so that, even in urban green areas such as the Ecological Pole, there is a potential for addressing issues that are not only the ecological relationships among living things.

We need to rethink our hegemonic model and we argue that one possible way are dialogical processes. Freire (1993, p.88) states that "Human Beings are not built in silence, but in word, in work, in action-reflection". This Brazilian educator has the dialogue as the essence of his theory. He believes it is in the encounter with the other, mediated by the world, that we seek to be more human and (re)construct the world. It is within this collective and participatory approach that we seek to act in EE.

Wals and Leij (2007) believe in the potential of social learning in the pursuit of sustainability. The authors state that this process occurs within a social context where differences of conflicting interests, norms, values and visions of reality provide a learning environment. This learning takes place at the individual and collective levels, involving different social actors to think of new ways to deal with current challenges in our society.

> This new kind of thinking means that we cannot think about the sustainability in terms of problems that are out there to be solved or 'inconvenient truths' that need to be addressed, but to think in terms of challenges to be taken on in the full realization that as soon as we appear to have met the challenge, things will have changed and the horizon will have shifted once again (Wals, Leij, 2007, p. 17).

Within this context of thinking about how to overcome conflicts and the search for new paradigms for our current society, Lotz-Sisitka (2002) challenges us to reflect on our own process of research and knowledge production, which she calls the globalization of knowledge production. The author tells of how she mechanically incorporated a research framework without thinking about their own reality and, later, how she questioned the process. She believes that building a collective construction between colleagues (teachers and students) contributes to this reflection on the paradigm in which we want to support ourselves.

When we assume that environmental issues should incorporate human culture and all its features (political, social, economic, religious, ethnic, etc.), we are considering the existence of environmental conflicts (Acserald, 2008). We believe that one of the tasks of environmental educators is unveiling the conflicts in order to show the depth of socio-environmental problems. Another goal of EE is to foster opportunities for dialogue, participation and collective decision making in seeking to resolve environmental conflicts

and / or reflect in which paradigm we want to support ourselves for rethinking the relationship between society and nature.

♦ ♦ ♦

References

Acserald, H. (2008). Grassroots reframing of environmental struggles in Brazil. In: Carruthers, D. V. (Ed.) *Environmental Justice in Latin America (pp*.75-97). Cambridge: MIT Press.

Andelman, M. (2001). La comunicación ambiental en la planificación participativa de las políticas para la conservación y uso sustentable de la diversidad biológica. *Tópicos en Educación Ambiental, 3*(9), 07-15.

Benáyas, J.; Gutiérrez, J.P. & Gutiérrez, E.G. (1999). Educación Ambiental em parques urbanos y espacios verdes: análisis de uma muestra de guias divulgativas y cuadernos didácticos. *Tópicos en Educación Ambiental*, *1* (1), 59-72.

Law No. 4771 of September 15, 1965 (1965). Establishing the new Forest Code. *Diário Oficial da União*, September 16, 1965 (nº 4771). Retrieved August, 2007, from http://www.planalto.gov.br/ccivil_03/LEIS/L4771.htm

Law No. 9985 of July 18, 2000 (2000). Regulates the art. 225, § 1, paragraphs I, II, III and VII of the Federal Constitution establishes the National System of Conservation of Nature and other measures.

Carvalho, L. M.(1999) Educação e Meio Ambiente na escola fundamental. *Projeto Revista de Educação*, *2*, 9-18.

Carvalho, L. M. (2006). A temática ambiental e o processo educativo: dimensões e abordagens. In: Cinquetti, H. S. & Logarezzi (Orgs), A. *Consumo e resíduo:* fundamentos para o trabalho educativo. São Carlos: Edufscar.

Carvalho, L.M., Campos, M.J.O, Cavalari, R.M.F., Marques, A.; Mathias, A. & Bonotto, D., (1996), Conceitos, valores e participação política. In: TRAJBER, R.; MANZOCHI, L. H. *Avaliando a Educação Ambiental no Brasil: materiais impressos (*pp. 77- 119). São Paulo: Gaia.

Diegues, A. C. (1996) *O mito moderno da natureza intocada*. São Paulo: Hucitec.

Dorado, O., Arias, D.M., Alonso, G., & Maldonado, B. (2002). Educación Ambiental para la biodiversidade em el trópico seco, Reserva de La Biosfera Sierra de Huautla, Morelos, México. *Tópicos en Educación Ambiental*, *4*(12), 23-33.

Fracalanza, D. C. (1992). *Crise ambiental e ensino de ecologia*: o conflito na relação homem- mundo natural. Thesis (Ph.D. in Education) Faculty of Education, State University of Campinas , Campinas, São Paulo, Brasil.

Freire, P. (2006). *Pedagogy of the oppressed*. New York: Madein Lane.

González-Gaudiano, E. (2002). Educación Ambiental para la biodiversidad: reflexiones sobre conceptos y prácticas. *Tópicos en Educación Ambiental*, *4*(11), 76-85.

Guimarães, M. (2004). Educação Ambiental Crítica In: LAYRARGUES, P.P. (org.). *Identidades da educação ambiental brasileira* (pp. 25-34). Brasília: MMA, Diretoria de Educação Ambiental.

Guimarães, M. (1995). *A dimensão ambiental na educação.* Campinas: Papirus.

Krasilchik, M. (2004). *Prática de ensino de biologia.* (4a ed). São Paulo: Editora da Universidade de São Paulo.

Lestinge, S. R. (2004) *Olhares de educadores ambientais para estudos do meio e pertencimento.* Thesis (Ph.D. in Forest Resources) - Escola Superior de Agricultura Luiz de Queiroz, University of São Paulo, Piracicaba, São Paulo, Brasil.

Lima, S. T. (1998). Trilhas Interpretativas: a aventura de conhecer a paisagem, *Cadernos Paisagem*. (3), 39-44.

Lotz-Sisitka, H. (2002). Weaving cloths: research design in contexts of transformation. *Canadian Journal of Environmental Education*, *7*(2),101-124.

Manzochi, L.H. (1994) *Participação do ensino de ecologia em uma Educação Ambiental voltada para a formação da cidadania*: a situação das escolas de 2º grau no município de Campinas. Dissertation (Master in Ecology) - Biosciences Institute, State University of Campinas, Campinas, São Paulo, Brasil

Marpica, N. S. (2008). *As questões em livros didáticos de diferentes disciplinas da quinta-série do ensino fundamental.* Dissertation (Master in Education). Center for Education and Human Sciences, Federal University of Sao Carlos, São Carlos, São Paulo, Brasil.

Mayer, M. (1998). Educación ambiental: de la acción a la investigación. *Enseñanza de las Ciências. 16*(2), 217-231.

Mendonça, R & Neiman, Z. (2003). *À sombra das árvores:* transdisciplinaridade e educação ambiental em atividades extra classe. São Paulo: Chronos.

Milano, M. S. (2000). Mitos no manejo de Unidades de Conservação no Brasil, ou a verdadeira ameaça. *Proceedings of the Brazilian Conference of Conservation Units*, Campo Grande, Mato Grosso do Sul, Brasil, 2.

Mohai, P. & Bryant, P. (1998). Is there a "race" effect on concern for environmental quality? *Public Opinion Quarterly, 62*(4), 475-505.

Moraes, R. (2005). Mergulhos discursivos: análise textual qualitativa entendida como processo integrado de aprender, comunicar e influir em discursos. In: GALIAZZI, M. C.; FREITAS, J. V. (orgs). *Metodologias emergentes de pesquisa em educação ambiental*.Ijuí, RS: Unijuí.

Moraes, R. (2003). Uma tempestade de luz: a compreensão textual possibilitada pela análise textual discursiva. *Ciência e educação*, *9*(2), 191-211.

Nicodemo, M. L. F. & Primavesi, O. (n.d.). *Por que manter árvores na área urbana?*. São Carlos: Embrapa Pecuária Sudeste, 2009. Retrieved september, 2009, from: http://www.cppse.embrapa.br/080servicos/070publicacaogratuita/documentos/Documentos89.pdf

Pacheco - Muñoz, M. F. P. (2002). Planeación educativa en los centros de recreación, educación y cultura ambiental. *Tópicos en Educación Ambiental, 4*(10), 63-74.

Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbury Park: Sage.

Pegoraro, J. L. & Sorrentino, M. (1998). Programa educativos com flora e fauna (expressões da biodiversidade) e educação ambiental. *Scientia Forestalis* (54), 131-142.

Peralta, C. H. G. (2002). Experimentos educacionais: eventos humorísticos transdisciplinares em Educação Ambiental. In: RUSCHEINSKY,A. *Educação Ambiental:* Abordagens Múltiplas (pp. 105- 125). Porto Alegre: Artmed Editora.

Phillips, A. (2004). The history of the international system of protected area management categories. *Parks, 14*(3), 4-14.

Pivelli, S. R. P. & Kawasaki, C. S. (2005) Análise do potencial pedagógico de espaços não-formais de ensino para o desenvolvimento da temática da biodiversidade e sua conservação. *Proceedings of National Meeting of Research in Science Education*, Bauru, São Paulo, Brasil, 5.

Robim, M. J. & Tabanez, M. F. (1993). Subsídios para a implantação da Trilha Interpretativa da Cachoeira-Parque Estadual de Campos do Jordão. *Revista Intituto Florestal*, *5*(1), 67-91.

Robottom, I. & Hart, P. (1993). *Research in Environmental Education*. Victoria: Deakin University.

Sauvé, L. (1999). La Educación Ambiental entre la modernidad y la posmodernidad: en busca de un marco de referencia educativo integrador. *Tópicos en Educación Ambiental*, *1*(2), 7-25.

Seniciato,T. & Cavassan,O. (2004). O. Aulas de campo em ambientes naturais e aprendizagem em ciências – um estudo com alunos do ensino fundamental. *Ciência & Educação,10*(1),133-147.

Sorrentino, M. (2000). Crise ambiental e educação. In: Quintas, J. S. (org.). *Pensando e Praticando a Educação Ambiental na Gestão do Meio Ambiente* (pp.93-104). Brasília: IBAMA.

Tabanez, M. F., Padua, S. M., Souza, M. G., Cardoso, M. M., & Garrido, L. M. A. G. (1997). Avaliação de trilhas interpretativas para educação ambiental. In: Padua, S. M. & Tabanez, M. F. *Educação Ambiental: caminhos trilhados no Brasil* (pp: 89-102). Brasília: Ipê- Instituto de Pesquisas Ecológicas.

Tristão, M. (2005). Tecendo os fios da educação ambiental: o subjetivo e o coletivo, o pensado e o vivido. *Educação e Pesquisa*, *31*(2), 251-264.

Tuan, Y. F. (1980). *Topofilia:* um estudo da percepção, atitudes e valores do meio ambiente. São Paulo: Difel.

Viveiro, A. A., & Diniz, R. E. S. (2009). Atividades de campo no ensino das ciências e na educação ambiental: refletindo sobre as potencialidades desta estratégia na prática escolar. *Ciência em tela*, *2*(1) Retrieved January, 2010, from: http://www.cienciaemtela.nutes.ufrj.br/artigos/0109viveiro.pdf Accessed jan. 2010.

Wals, A. E. J., & Leij, T. (2007). Introduction. In: WALS, A.E.J.(ed) *Social learning towards a sustainable world*. (pp.17-32) Wageningen: Wageningen Academic

Appendices

Appendix A - Teachers interview – partial guiding questions list

1-) Today, there is much talk about environmental education, besides it being in the Constitution, we have a National Environmental Education Policy, which among other things, implements EE at all educational levels. Thus:

a-) What is environmental education?

b-) Do you think teachers can contribute to this work? If yes, how (which content should be addressed?)

2-) One of the issues present in environmental education is values changing. Thus:

a-) Do you consider that the moral and aesthetic values may be related to environmental degradation? Why?

b-) Can the school and the teacher act in this sphere, ie, can they contribute to building a new paradigm where the prevailing values are reviewed? If yes, how (which themes we should approach, which activities should be developed, what methodologies should be adopted)?

c-) During the visits to the units of the São Carlos Ecological Pole, do you consider that the issue of values has been mentioned? How?

d-) Could this dimension have been more widely discussed?

3-) Another aspect that was discussed is society´s participation in decision-making.

a-) Is it the teacher´s and the school´s job to form a citizen concerned with political issues? If yes, how (which themes we should approach, which activities should be developed, what methodologies should be adopted)?

b-) During the visits to the units of the São Carlos Ecological Pole, do you consider that the issue of participation was mentioned? How?

c-) Could this dimension have been more widely discussed?

Appendix B - Interview script used for people involved with EE work in the units of the São Carlos Ecological Pole

1-) What is your training?

2-) How did you come to work here?

3-) Do you know the history of this unit / institution?

4-) Environmental issues are being widely discussed in most (if not all) segments of society. For you, what is environmental education?

5-) This being a unit of the São Carlos Ecological Pole, we believe that this area may potentially contribute to the formation of environmentally educated citizens. Could you say (describe??) which topics can be discussed here so this objective can be achieved?

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 133-153.

Daha Kapsamlı Çevresel Eğitim Çalışması İçin Farklı Eğitim Alanlarının ve Potansiyellerinin Entegrasyonu

Valéria Ghisloti Iared*
Federal University of São Carlos, Brazil

Haydée Torres de Oliveira
Federal University of São Carlos, Brazil

Özet

Bu araştırmanın amacı Sao Carlos Ekolojik Kutbu'nun bir eğitim alanı olarak çevresel konuların karmaşıklığının anlaşılmasına, aidiyet ve sosyal sorumluluk duygusunun artmasında katkısının ne olduğunu anlamaktır. Bu alanları ziyaret eden öğretmenlerle ve b alanlarda çevre eğitimi yapan üyelerle ve rehberli turlarla Ekolojik Kutbu ziyaret edenlerle görüşmeler yapıldı. Bu faaliyetlerin eğitim uygulamalarının üç boyutunu kapsadığı belirlendi. Bilişsel (bilgi), öznel (duygular, ilkeler, etik) ve politik. Tüm bu parametreleri geçerli bir çevre eğitimi çalışmasında temel kabul etmek mümkündür ancak, bunların toplamı göz önüne alındığında hepsinin dikkate değer olduğu belirlenmiştir. Sonuç olarak bu birimlerin entegrasyonunun çevre eğitiminin verimliliğini yükselteceği fikrini güçlendirmektedir

Anahtar Kelimeler: eğitim alanları, şehirdeki açık doğal alanlar, eğitsel boyutlar, dışarı aktiviteleri, eleştirel çevre eğitimi

* Valéria Ghisloti Iared, Federal University of São Carlos, Tiradentes, Street 527 / São Carlos, SP, Brazil/ ZIP code: 13560-430, Phone: 55 16 34126094, valiared@gmail.com.

ISSN: 2146-0329

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 155-161.

INSTRUCTIONAL PRACTICE

Field Based Learning about Butterfly Diversity in School Garden-A Case Study from Puducherry, India

Alexandar Ramadoss*
Pondicherry University, India

Gopalsomy Poyya Moli
Pondicherry University, India

Received: December 2010; Revised: February, 2011; Accepted: May 2012

Abstract

Butterflies are critical components of functioning ecosystem due to their key roles as pollinators and as indicators of ecosystem health. Butterflies are also beloved by public as well as young students and children, which is largely unaware that many species are threatened or endangered. The main objectives of this field trip education for butterfly conservation were to create knowledge, interest and necessary skills to investigate, identify the butterfly species and conserve butterflies diversity in school gardens. For butterfly survey the census technique methods was facilitated with students to investigate the diversity of butterflies during the field trips. As the result of this field trip learning about butterfly study, A total of 34 butterfly species belonging to 4 families were recorded with standard literature and colour photographs of which Nymphalidae family was dominant species found in school gardens. The study concluded that the young students must be given the chance to investigate, engage with, and experience nature in order to appreciate, and motivate to conserve and protect these fascinating insects at local level. The conservation of our natural biological resources would be dependent upon future generations. This field based learning program inspired to identify and conserve the butterfly diversity within the school gardens.

Keywords: Field based education, butterfly, conservation.

Introduction

India is known for its rich biodiversity. India is one of the 17 mega-diverse countries in the world. With only 2.4% of the world's geographical area, its contribution for worlds

* Alexandar Ramadoss, Pondicherry University, Department of Ecology & Environmental Sciences, Puducherry, India. Phone: +91 962 674 1155, e-mail: enviroalexandar@gmail.com

ISSN: 2146-0329

biodiversity ranging from 7-8% of the total world's recorded floral diversity (about 45,000) and faunal diversity (about 91, 000). India has ten bio geographic zones possess an exemplary diversity of ecosystem like alpine forests, grasslands, wetlands, coastal and marine ecosystems, and desert ecosystems. India has four out of thirty four global biodiversity hotspots of these the eastern Himalaya which has rich butterfly diversity closer to 300 butterfly species and Western Ghats are highly endemic flora and fauna, which is an indicator of high degree of endemism in India. About 5,150 plant species and 1,837 animal species are endemic to India. India's biodiversity includes wild relatives of agricultural crops and domesticated animals. India has 16 major types' and251 subtypes of forests. The large mosaic of distinct agro-ecosystems has contributed to diverse cropping pattern and systems across the country (India & CBD cop 10 Nagoya Japan 2010).

The world butterfly species around 17000 and in India the butterfly species recorded are closer to 1225 of which Hesperids 321, Palionids 107, pierids 109, Lycanids 443, Nymphalids 521 (Issack Kehimer BNHS). They are one of the most amazing and magnificent elements of biodiversity, spread through diverse habitats from cooler regions to tropical forests. In the Neo tropical region, 31.4 % of species were described, representing the highest diversity in global biomes (Heppner1991). It is estimated that the richness of this order could reach 500.000 species, and just 7.784 species of butterflies are known (http://diversityindia.org/butterfly.php downloaded on 9-10-2010).

Attitudes and enthusiasms in students towards field trips are very positive. Field trips are an important teaching tool. Students learn about local natural environment in a less formal setting than the classroom and this encourages interactions with teachers and students. Principles that are merely black and white concepts of the two dimensional black board become illustrated in full, three dimensional colours. Field trips are effective tool in teaching ecology (Lisowski & disinger 1992) but can be appropriate for almost all class in biology.

Teaching about biological diversity in the natural field brings students into the out of classrooms to a natural place where they are given the opportunity to understand the interaction between plant and animal with their natural environment wholeness (Thomashow, 2001;Burkholder, 2003), where they can perceive their understanding about the natural systems with their existing knowledge with their mind setup (Orr, 1992), and where they can deepen/fascinating, feelings their connection with nature (Cuthbertson, Dyment, Curtnoys, Potter & O'Connell, 2003).This way of active teaching provides students with theoretical subject knowledge with personal direct experience with nature (Orr, 1992; Wilson, 1998). This kind of experiential learning move students toward self perception about nature, and theory overlap and are integrated. (Burkholder, 2003). This way of learning encourages students to see nature as a primary source of information and inspiration, as motivator and classroom, and, primarily, as home a place that provides comfort, protection , and gives meaning to life all of which supports the process of learning and creates a meaningful and memorable learning experience (Cuthbertson, Dyment, Curthoys, Potter, & O'Connell, 2003). When the learning about nature occurred in the field the students are completely immersed with the natural world the learning and ecological communities the experience is more meaning full and development in student's attitudes and knowledge (Dittrick, 2003).

Objectives of butterfly study

The main objectives of this field based butterfly educational program was to promote, protect and restore native butterflies and their habitats and enhance student's knowledge and skills of butterfly ecology, identification and conservation through field based

education, investigate varieties of butterfly biodiversity within school campus, give students opportunities to contribute to butterfly protection and its habitat restoration.

Methods

Classroom sessions

The students with middle school level VIII and IX standard in the age group between13-15 were selected from Chewalier Sellane Higher Secondary School (CSS) and Jawahar Navodya Vidyalaya School (JNV) from Puducherry region based on their interest/motivation. The students were facilitated with butterfly the introduction to the definition and etymological background of butterfly biology, identification of the stages of butterfly lifecycle, habitat requirements for butterflies, factors responsible for the butterfly endangerment, butterfly roles in pollination, name of several different kinds of butterflies, and ecological role played by butterflies and conservation needs and methods were imparted to the students through varieties of active learning classroom interactive sessions this was carried out during January 10th to May 30th 2010 which includes lectures, power point presentations, documentary films, puppetry shows, dramas, debates, group discussions and drawing competitions.

Census Route Design

During the field days the students were trained to investigate the butterfly census in the month of March 2010 within the JNV and CSS school campuses. The census route design and field methodology were adapted from Jaret C. Daniels and Emily Heffernan Florida Butterfly Monitoring Network that was used for butterfly investigation program with school students. Students transacted a variety of different vegetative areas such as in flower garden, natural vegetation and trees in the school gardens. The Census routes were additionally encompassed several plant communities such grass lands, medicinal garden and ornamental plants, the plant communities traversed by the census route were delineated and prominent features marked. This was observers when they have moved from one habitat to the next and to tally butterflies in the appropriate column on their data sheets.

Census Procedure

Census methods as suggested by Jarret 2000 C. Daniels Florida Butterfly Monitoring Centre (FBMN) were used for butterfly survey, there was one student act as observer, Other students were accompanying this observer to help in record/spot keeping or identifying of butterflies only. Only the observer was spotting butterflies. While the observer noticing the recorder was pointing it out. During the observation the observer was always preceded at a uniform pace. The butterfly census carried out between 10 AM noon or 2 4PM with less than 50% cloud cover, and moderate light as the butterflies very active during this time. The directional radiuses of roughly 6 meters (20 feet) to each side of the route were maintained for survey. Census routes were conceptualized as corridors, 12 meters (40 feet) in width. Each butterfly was tallied on the data sheet while doing butterfly survey the plant community were also recorded of each section of the census route which are mostly preferred by butterfly species in the gardens. During the butterfly survey students were instructed not to remove/harm any butterfly from the site. Butterflies were identified with standard references and colour photographs.

Butterfly Diversity

As a result of the students butterfly survey a total of 34 species of butterflies (Table 2) falling within 4 families were observed in the school gardens. The dominant family is Nymphalidae

with 15 species, followed by Lycaenidae 8, Pieridae 6, species and Papilionidae 5 species. The diversity and abundance of species is highly correlated with the availability of food plants in the surroundings (Kunte 2000, Raut and Pendharkar 2010). Occurrence of maximum number of species in the family Nymphalidae attracted more with nectar producing plants flower gardens, and other natural vegetations occurred in the school campus (Table 1).

Table 1.
Nectar Plants species which attracts butterflies in both the school campus

No	Common name	Scientific	Family	Habitat
1	Blue port weed	*Stachytarpheta jamaicensis*	*Verbenaceae*	low, sprawling shrub
2	Dronapushpi	*Leucas aspera*	Labiatae	Sub shrub
3	Spanish Flag	*Lantana camara*	Verbanaceae	Herb
4	Shaggy buttenweed	Spermacoce hispida	Rubiaceae	Herb
5	Burr Bush	*Triumfetta rhomboidea*	*Tiliaceae*	woody herb or shrub
6	Jungle Geranium	*Ixora coccinea*	*Rubiaceae*	common flowering shrub
7	coat buttons	*Tridax procumbens*	Asteraceae	Sub shrub weed
8	Sleepy Morning	*Waltheria indica*	Malvaceae	Shrub
9	Little ironweed	*Vernonia cinerea*	Asteraceae	Shrub
10	Ornamental Plant	*Desmodium triflorum*	Fabaceae	Herb
11	horsenettles	*Solanum trilobatum* L	Solanaceae	Shrub
12	Sessile joy weed	*Alternanthera sessilis*	Amaranthaceae	Shrub

Table 2.
Butterfly and moths of Javagar Navodya Vidyalaya School campus (JNV), Puducherry, India

FAMILY	COMMON NAME	SCIENTIFIC NAME
Papilionidae	Crimson Rose	*Pachliopta hector* (Linnaeus, 1758)
	Common Rose	*Pachliopta aristolochiae* (Fabricius, 1775)
	Helen, Red	*Papilio helenus* (Linnaeus, 1758)
	Lime Butterfly	*Papilio demoleus* (Linnaeus, 1758)
	Mormon, Common	*Papilio polytes* (Linnaeus, 1758)
Pieridae	Emigrant, Mottled	*Catopsilia pyranthe* (Linnaeus, 1758)
	Emigrant, Common	*Catopsilia pomona* (Fabricius, 1775)
	Jezebel, Common	*Delias eucharis* (Drury, 1773)
	Cabbage, White	*Pieris brassicae* (Linnaeus, 1758)
	Green-veined, White	*Pieris napi* (Linnaeus, 1758)
	Grassyellow, Common	*Eurema hecabe* (Linnaeus, 1758)
Lycaenidae	Pierrot, Common	*Castalius rosimon* (Fabricius,1775)
	Tiny grass, Blue	*Zizula gaika (Trimen, 1862)*
	Dark grass, Blue	*Zizeeria lysimon* (Hübner 1798-1803)
	Zebra, Blue	*Tarucus plinius* (Fabricius, 1793)
	Pea, Blue	*Lampides boeticus* (Linnaeus, 1767)
	Cerulean, Common	*Jamides celeno* (Cramer, 1775)
	Gram, Blue	*Euchrysops cnejus (*Fabricius 1798)
	Jewel, Grass	*Chilades trochylus* (Freyer 1845)
Nymphalidae	Castor, Common	*Ariadne merione* (Cramer, 1779)
	Eggfly, Great/Common	*Hypolimnas bolina* (Linnaeus, 1758)
	Grass Blue, Tiny	*Zizula gaika* (Trimen, 1862)

Pansy, Chocolate	*Precis iphita* (Cramer 1779)
Pansy, Grey	*Junonia atlites* (Linnaeus, 1763)
Pansy, Lemon	*Junonia hierta* (Fabricius, 1798)
Pansy, Peacock	*Junonia almanac* (Linnaeus, 1758)
Pansy, Blue	*Junonia orithya* (Linnaeus, 1764)
Tiger, Blue	*Tirumala limniace (*Cramer, 1775)
Tiger, Plain	*Danaus chrysippus* (Linnaeus, 1758)
Tiger, Striped	*Danaus genutia* (Cramer, 1779)
Crow, Common	*Euploea core* (Cramer, 1780)
Five ring , Common	*Ypthima baldus* (Fabricius, 1775)
Four ring, Common	*Ypthima huebneri (*Kirby, 1871)
Leopard, Common	*Phalanta phalantha* (Drury, 1773)

Discussion

Butterflies are threatened by many aspects predominantly by anthropogenic and climate change which cause severe threats to butterfly diversity. Butterflies are used in biogeography, plant-insect interactions researches, as important pollinator, environmental bio indicators, since they can indirectly assess environmental variations due to its sensitivity to climatic conditions, levels of lightness and proportion of vegetation cover. Butterflies are of least concern in terms of conservation, but there are unique beautiful creatures with more ecological importance, which needs to be conserved. Exploration and experiential study allow the young students to love and conserve the nature, this type of activity based biodiversity education created the wonder, sympathy, and creativity among students to conserve these beautiful insects. Continuous field trip exposure is important for children to acquire a deep sensitive understanding of the natural world that is the foundation of biodiversity conservation. Children need to be given the chance to investigate, engage with, and experience with nature in order to appreciate and love the immediate environment. The result of these field based butterfly education reflect the students experiences and enthusiasm in protection and conservation of butterfly species its associated plants and more nectar plants have been decided to increase in the school campus in order to attract more butterfly species in the school campus.

Recommendations for butterfly conservation in school campuses

Conservation of butterfly diversity in school campuses with varieties of native herbs, shrubs and trees which foliage, nectar, pollen, seeds needs protect and conserve these kinds of plant species within the school gardens in order to provide suitable habitat for conservation of butterfly diversities in schools.

Design conservation of butterfly action with student's participation within the school campuses. Popularise Butterfly species diversity knowledge its ecological sustenance among school children. Establish Butterfly garden within school campus and promote conservation education students as well as local community for butterfly conservation

♦ ♦ ♦

References

Lisowski, M., and J.F. Disinger. 1992. The effect of field based instruction on students understanding understanding on ecological concepts. Journal of environmental education 23: 19-23.

India & CBD cop 10 Nagoya Japan 2010

Issack Kehimer 2008 Bombay Natural History Society (BNHS), India

Thomashow, M. (1995). *Ecological identity*: Becoming a reflective environmentalist. Cambridge, MA: The MIT Press.

Thomashow, M. (2001). A biosphere natural history. *ORION 20* (4): 24-37.

Burkholder, R. E. (2003). To see things in their wholeness: Consilience, natural history, and teaching literature outdoors. In H. Crimmel (Ed.), *Teaching in the field: Working with students in the outdoor classroom*. (pp. 17-32). Salt Lake City, UT:The University of Utah Press.

Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. Albany: State University of New York Press.

Cuthbertson, B., Dyment, J., Curtnoys, L. P., Potter, T. G., & O'Connell, T. (2003).Engaging nature: A Canadian case study of learning in the outdoors. In H.Crimmel (Ed.), *Teaching in the field*, (pp. 77-98). Salt Lake City, UT: The University of Utah Press.

Elder, John, Ed. (1998) *Stories in the Land: A Place-Based Environmental Education*

Orion, N., and A. Hofstein.1994. Factors that influence learning during a scientific field trip in a natural environment. Journal of Research in Science Teaching 31:1097 1119.

Shirley Cummins & Gloria Snively 2000 The Effect of Instruction on Children's Knowledge of Marine Ecology, Attitudes Toward the Ocean, and Stances Toward Marine Resource Issues Canadian Journal of Environmental Education, 5, Spring 2000

Jarret 2000 C. Daniels Florida Butterfly Monitoring Centre (FBMN)

Kunte, K. 2000. *Butterflies of peninsular India (India: A Lifescape)*. Hyderabad: Universities press (India) Limited. 272 p.

Pendharkar 2010 Butterfly (Rhopalocera) fauna of Maharashtra Nature Park, Mumbai, Maharashtra, India, Check List Volume 6 Issue 1 2010

Issack Kehimer the Book of Indian Butterflies published by Bombay Natural History Society India (BNHS)

Heppner J.B.1991 faunal regions and the diversity of Lepidoptera, tropical Lepidoptera 2 (supl 1) 1to 85

International Electronic Journal of Environmental Education
Vol.2, Issue 2, 2012, 155-161.

ÖĞRETİM UYGULAMASI

Okul Bahçesinde Kelebek Çeşitliliği Hakkında Alan Temelli Öğrenme- Puducherry, Hindistan'dan Durum Çalışması

Alexandar Ramadoss*
Pondicherry University, India

Gopalsomy Poyya Moli
Pondicherry University, India

Özet

Kelebekler tozlayıcı olarak kendi anahtar rolleri nedeniyle ekosistemlerin iyi işlemesi için ve ekosistem sağlığı göstergeleri gibi temel bileşenleridir. Ayrıca kelebekler insanlar tarafından özellikle pek çok türün tehdit altında olduğundan büyük ölçüde habersiz olan genç öğrenciler çocuklar tarafından sevilen varlıklardır. Kelebeklerin korunması için alan bazlı temel eğitimin temel hedefi bilgi, ilgi ve gerekli becerileri oluşturmak bu sayede okul bahçesindeki kelebek türlerini tanımak ve korumaktır. Kelebek araştırmaları için sayım tekniği yöntemi arazi gezilerinde kelebek çeşitliliğinin araştırmak amacıyla öğrencilere öğretildi. Alan gezisi sırasında 4 familyaya ait toplam 34 kelebek türü standart literatür ve renkli fotoğraflar ile kaydedildi. Nymphalidae familyası okul bahçelerinde bulunan baskın tür olarak belirlendi. Çalışmada genç öğrencilerin bu büyüleyici böcekleri yerel düzeyde korumak için motive edilmeleri, soruşturma yapmaları ve doğa deneyimi için şans verilmesi gerektiği sonucuna varılmıştır. Doğal biyolojik kaynakların korunması gelecek nesillere bağlı olacaktır. Bu alan tabanlı öğrenme programı okul bahçeleri içinde kelebek çeşitliliği belirlemek ve korumak için ilham kaynağı olmuştur.

Anahtar Kelimeler: Alan temelli eğitim, kelebek korunması, sayım tekniği, bioçeşitlilik

* Alexandar Ramadoss, Pondicherry University, Department of Ecology & Environmental Sciences, Puducherry, India. Phone: +91 962 674 1155, e-mail: enviroalexandar@gmail.com

ISSN: 2146-0329