

RECYCLE, REDUCE, REUSE EDUCATION FOR KINDERGARTEN  
CHILDREN

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## **ABSTRACT**

### **RECYCLE, REDUCE, REUSE EDUCATION FOR KINDERGARTEN CHILDREN**

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The present study investigated the influence of six-week implementation pertaining to 3Rs including composting on 60-72 month-old kindergarten children's eco-management and persuasion behaviors at both school and home environments. Additionally, how the precursors of kindergarten children's behaviors related to 3Rs containing composting exhibited by the kindergarten children were supported by activities throughout the implementation was analyzed. The current study also examined the influence of implementation on the alteration in their parents' and teacher's views and its reflections on their home environments. The participants of this study were 24 kindergarten children (60-72 months old), 23 parents and one teacher. Data were collected from children, parents and teacher through interviews. The findings of the present study indicated that six-week implementation had significant changes on children's eco-management and persuasion behaviors related

to 3Rs including composting. What's more, their behaviors seemed to be influenced by environmental knowledge, personal investment, situational factors and environmental attitude. These findings were supported by the data obtained from parents and teacher at the implementation as well. Besides, the implementation was also found to be influential on parents' and teacher's behavior and views related to 3Rs and composting.

Keywords: environment; recycle, reduce, reuse; early childhood education; eco-management; persuasion

## ÖZ

### ANASINIFINA DEVAM EDEN ÇOCUKLAR İÇİN AZALT, TEKRAR KULLAN, GERİ KAZAN EĞİTİMİ

Alıcı, Şule

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Bu çalışma, kompost yapımını içeren azalt, tekrar kullan, geri kazan ile ilgili altı haftalık bir uygulamanın 60-72 aylık, anasınıfına devam eden çocukların hem okul hem de ev ortamındaki fiziksel koruma ve ikna davranışları üzerine etkisini incelemiştir. Ayrıca, anasınıfı çocuklarının kompost yapımını kapsayan 3R ile ilgili davranış öncüllerinin uygulama sürecinde aktivilerle nasıl desteklendiği araştırılmıştır. Bu çalışma, uygulamanın veliler ve öğretmenlerin davranışları ve görüşleri üzerindeki etkisini de incelemiştir. Bu çalışmanın katılımcıları anasınıfına devam eden 24 çocuk (60-72 aylık), 23 veli ve bir öğretmendir. Veriler; çocuklar, veliler ve öğretmenlerden görüşmeler yoluyla toplanmıştır. Bu çalışmanın bulguları, altı haftalık uygulamanın çocukların kompost yapımını içeren 3R ile ilgili fiziksel koruma ve ikna davranışları üzerinde önemli değişimlere yol açtığını göstermiştir. Dahası, çocukların davranışlarının çevresel bilgi, kişisel yatırım, durumsal faktörler ve çevresel tutum öncüllerinden etkilendiğini ortaya koymuştur. Bu bulgular, uygulamada yer alan veliler ve öğretmenlerden elde edilen verilerle de desteklenmiştir. Bunun yanısıra, uygulamanın veliler ve öğretmenlerin 3R ve kompost yapımı ile ilgili davranışları ve görüşleri üzerinde de etkili olduğu bulunmuştur.

Anahtar Kelimeler: evre; azalt, tekrar kullan, geri kazan; okulncesi eđitimi; fiziksel koruma davranıřı; ikna davranıřı

*Dedicated to My Mother*

*&*

*To My Father*

*&*

*To My Brother...*



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## **LIST OF ABBREVIATIONS**

**EE:** Environmental Education

**ERB:** Environmentally Responsible Behavior

**EL:** Environmental Literacy

**EfS:** Education for Sustainability

**ESD:** Education for Sustainable Development

**3Rs:** Recycle, Reduce, Reuse

**ECE:** Early Childhood Education

**MoNE:** Ministry of National Education in Turkey

## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Background of the Study**

Given that the world population is growing rapidly day by day, the influence of human beings on the environment in general, on ecological balance in specific, has started to become more apparent, especially on climate change, resource deterioration and extinction of species (Elliot, 2010; Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011). According to the Population Reference Bureau (2011), the world population is expected to reach 9 billion by 2050. It is foreseen that this boost in population will result in many environmental problems, among which are decline in public space, riverbank infringement, air and water pollution, excessive consumption of natural resources and solid waste generation (Chan, Choy & Lee, 2009; United Nations Environment Programme (UNEP), 2001e). In Turkey, air pollution, water pollution, solid waste and unplanned urbanization were also determined as common environmental problems (Ministry of Environment and Forestry, 2010). Since restricted natural resources have started to be consumed rapidly, it is vital that people change their everyday life styles affecting the unsustainable current environmental development and its impacts on future generations (Barr, 2007, Chan, Choy & Lee, 2009). In other words, people should abandon the belief that “there are no limits to growth”, be aware of the environmental problems around them, try to produce solutions to problems, avoid excessive use of environmental sources and conserve the existent situation of the environment for a sustainable future and a high-quality life (Davis, 1998). Due to the Earth’s limited natural resources, how to conserve raw materials and reduce and/or dispose of the waste becomes crucial with each passing year (Chen & Tung, 2010). Particularly in developing countries like Turkey, the problem of solid municipal waste generation is usually eliminated through land-filling, the traditional solution

process, which results in serious negative outcomes in terms of environmental pollution, public health and sustainability (Mosler, Tamas, Tobias, Rodríguez & Miranda, 2008). Thus, the management of solid waste continues to remain a main issue in urban areas around the world specifically in the rapidly growing cities and towns of developing countries (Foo, 1997). According to Hopper, Yaws, Ho and Vichailak (1993), there are two fundamental procedures in municipal solid waste (MSW) minimization: source reduction and recycling. Of the two distinct methods for diminishing MSW, recycling is perceived to be an increasingly prevalent resolution as it does not only reduce the waste, but also converts materials into valuable sources. These materials, such as glass, metal, plastics, and paper are gathered, classified, and transported to places where they can be processed into new materials or products (Chen & Tung, 2010). One further solution is encouraging people to make composting with household waste to contribute source reduction of the amount of biodegradable waste (Edgerton, McKechnie & Dunleavy, 2009). Not only recycling but also composting contributes to environmental, economic, and social benefits (Chen & Tung, 2010; Edgerton, McKechnie & Dunleavy, 2009). Hence, there is an urgent need to construct a “frame of mind”, which affects each individual’s thought, decision or action to live sustainably (Bonnet, 2004; Elliot, 2010). Many possible approaches, such as government policy, international agreements, corporate leadership, educational programs, and technological innovations can be influential in diminishing the waste of resources and generate a sustainable environment. In addition, changing individuals’ behaviors plays an important role because all individuals consume materials and energy in their everyday lives and each person can make behavioral choices that would be of benefit to the environment. These behaviors are called environmentally responsible behaviors (Osbaldiston & Schott, 2012).

Environmentally responsible behavior (ERB), the ultimate outcome of environmental education (EE), is classified into five categories: (a) eco-management (such as, recycling, reusing, reducing, picking up litter or other waste types, composting organic matter such as leaves and vegetable wastes). This is similar to

the 3Rs- Recycle, Reduce and Reuse, which are also among the 7Rs “Reduce, Re-use, Respect, Reflect, Rethink, Recycle and Redistribute”- which were first introduced by OMEP (World Organization for Early Childhood Education) in 2010 to organize education for sustainable development (ESD) in early childhood education (ECE); (b) consumer/economic action (such as preferring to buy recycled or easily recyclable products, to protest against certain goods or eco-friendly products); (c) persuasion (such as talking to a friend/parents/siblings/relatives about recycling and encouraging them to recycle); (d) political action (such as requesting recycle bins from local governments, writing a letter to a legislator, requesting a recycling center for the community); and (e) legal action (such as reporting violations of existing laws to authorities) (Marcinkowski & Rehring, 1995 as cited in Hsu, 1997). In order to promote individuals to gain environmentally responsible behaviors in educational environments, it is significant to explain environmentally responsible behavior and the relationships between environmentally responsible behavior and its predictors such as environmental knowledge and environmental attitudes. Hence, several models are constructed by researchers. In a linear or knowledge-attitude-behavior (K-A-B) model, accepted as a traditional model, if one’s ecological knowledge is raised, his/her awareness related with environment and its problems increases and starts to change his/her attitude, and thus, s/he behaves more responsibly toward the environment (Ramsey & Rickson, 1977). After a meta-analysis with 128 empirical studies was conducted, the Hines model, another model regarding responsible environmental behavior was proposed by Hines, Hungerford and Tomera in 1986/87. While the traditional model describes “environmental knowledge” as a main predictor of behavior, the Hines model determines “intention to act” as a major precursor of behavior, which is a variable affected by other variables such as cognitive knowledge, cognitive skills and personality factors (attitudes, locus of control and personal responsibility). In other words, unless an individual has adequate knowledge about environmental problems and of action strategies (skills) concerned with the given problem, s/he cannot act intentionally. They also identified situational factors as either strengthening or counteracting the variables in the model (Hines et al., 1986/87). By utilizing the

Hines Model of Responsible Environmental Behavior (REB) and subsequent research related with this model, another model of environmentally responsible behavior known as the Environmental Behavior Model was put forward by Hungerford and Volk in 1990. In this model, there are seven variables as key indicators, which are divided into three categories: “entry level variables”, “ownership variables”, and “empowerment variables”. Entry level variables are strong precursors of behavior and contain prerequisite variables (environmental sensitivity, androgyny, knowledge of ecology and attitudes toward the environment and environmental issues), which improve an individual’s decision-making process before s/he takes action. Ownership variables (personal investment in environmental issues, in-depth knowledge about issues, knowledge of the consequences of behavior, personal commitment to issue resolution) personalize environmental issues via increase in knowledge and investment. Empowerment variables are perceived as keystones of training in environmental education to encourage individuals to feel that they have ability to make a change and contribute to the solution of environmental problems and issues. These variables include knowledge regarding the use of environmental action strategies, skills in using environmental action strategies, locus of control and intention to act. According to this model, if an individual demonstrates the development of many of these variables, it is likely that s/he will behave more responsibly toward the environment; however, only some of these variables are teachable and they should be an essential part of environmental education (Mony, 2002). Therefore, environmental education programs should provide opportunities for individuals to develop these characteristics in order to support the development of environmentally responsible behavior since education plays a key role in accomplishing such developments. While general education presents general solutions for environmental problems, specific environmental education presents particular solutions for them (Dogan, 1997). Since the early 1970s, the basic interconnected components of environmental education had been explained by famous slogan: *education about environment, education in the environment and education for the environment* (Davis, 1998; Scoullos & Malotidi, 2004). *Education about environment* is generally concerned with cognitive aspects such as gaining of

skills, knowledge and comprehending the environment and environmental issues. *Education in the environment* focuses on the education process which takes place outside of the classroom. It presents first-hand experience with the environment and thus arouses interest and positive feelings toward the environment. Moreover, *education for the environment* intends to develop an informed attitude and behavior toward the environment (Davis, 1998; Scoullos & Malotidi, 2004). In other words, the existing literature indicates that the ultimate outcome of environmental education is to develop an environmentally literate person, and thus society (Culen, 2001; Roth, 1992; Stapp, 1969). Therefore, all branches of education, including early childhood education, attempts to raise awareness of, and explores ways to carry out environmental/ sustainability education (Elliott & Davis, 2009).

The Earth Summit in Rio (1992) also drew attention to education in early years, claiming that via education young children can comprehend problems and issues about the environment and gain skills and attitudes necessary for tackling these problems. Specifically, Chapter 25 on Children and Youth in Sustainable Development in Agenda 21 has pointed out that “children need to be taken fully into account in the participatory process on environment and development in order to safeguard the future sustainability of any actions taken to improve the environment” (United Nations, 1992, p.200). In other words, it is important that environmental education or education for sustainable development should begin in early childhood years since children’s basic values, attitudes, skills, behaviors and habits are formed during these years (Lumboria, 2004; Mustard, 2000; NAAEE, 2010; UNESCO, 2008; Tilbury, 1994; Wilson, 1994). The significant effect of preschool education on elementary school students’ environmentally responsible behavior was also shown by Erdogan (2009). In a meta-analysis study conducted by Zelezny (1999) it was found that educational interventions with younger participants were more influential and its impact was endured longer than that in adult participants. According to Zelezny, “younger participants are more influenced by interventions because they learn new pro-environmental behaviors more easily, and they are more interested in environmental issues and in improving the environment, or they are more eager to

present themselves as pro-environmental if that is interpreted to be more socially desirable” (Zelezny,1999, p,12).

The effect of children’s participation in programs or activities related to environmental education on adults’ environmental knowledge, attitudes, and behaviors was also highlighted by many researchers (Ballantyne, Conell & Fein, 1998; Leeming, Porter, Dwyer, Cobern & Oliver, 1997). This indicates that children act as catalysts of change in sustainable thinking and behavior in their homes and communities (Davies, Engdahl, Otieno, Pramling-Samuelson, Siraj-Blatchford & Vallabh, 2009; UNESCO, 2008).

Therefore, it is crucial that young individuals be instructed about the environment for the future survival of our planet (Louv, 2006). As also declared in the 2006 report by the Organization for Economic Co-operation and Development (OCED), investing in early childhood education results in crucial gains given that preschool children will have an active role in environmental improvement as well as protection in the future as adults and be role models for their families, and thus, the society (Grodzinska-Jurczak, Stepska, Nieszporek & Bryda, 2006; Palmer, 1996; UNESCO, 2008).

## **1.2 Significance of the Study**

The utmost purpose of environmental education has been considered to be the development of environmentally responsible behavior (ERB) and environmentally responsible and active citizens (Borden & Schettino, 1979; Gotch & Hall, 2004; Hungerford & Volk, 1984, 1990; Leeming, Dwyer, Porter & Cobern, 1993; Ramsey & Hungerford, 1989). To reach this aim, environmental education/education for sustainable development should begin in early childhood years based on life experiences since these experiences play a catalyst role in shaping life-long attitudes, values and patterns of behavior toward the environment (NAAEE, 2010; UNESCO, 2008; Tilbury, 1994; Wilson, 1994). According to Siraj-Blatchford (2009), a majority of the essential values of tomorrows’ society are shaped in the early



childhood context, and thus, early childhood education has a key role in accomplishing sustainable development. In other words, preschool children can be brought up as key players for generating sustainable futures as long as they are promoted to be “problem seekers, problem solvers and action takers in their environment” via appropriate pedagogies (Davis, 2007). However, the contribution of early childhood education to a sustainable society has begun to gain attention in the 21<sup>st</sup> century.

In 2007, the first international workshop, entitled “The Role of Early Childhood Education for a Sustainable Society”, was held in Goteborg. In this workshop, the increase in investment in early childhood education, the vital role of early childhood education in realizing sustainable development, the integration of education for sustainable development in early childhood education and the importance of the early childhood curriculum including “content that fosters caring attitudes and empathy vis-à-vis the natural environment, the concept of learning for life, i.e. learning for sustainability; and activities built around the 7Rs: reduce, reuse, repair, recycle, respect, reflect and refuse” (Pramling-Samuelsson & Kaga, 2008, p.15) were highlighted and presented to representatives from all over the world. The 7Rs have been further developed and arranged in terms of the three pillars of sustainable development (environmental protection, economic development, and social and cultural development) as “Reduce, Reuse, Respect, Reflect, Rethink, Recycle and Redistribute” by the OMEP World Assembly (OMEP, 2011). In other words, to contribute to the formation of a generation sensitive to environmental issues and problems, an education system that encourages individuals to actively participate in the resolution of problems, to use natural resources sustainably, and to collaborate with others to this end is constructed. In addition, appropriate conditions are provided for individuals from early years of childhood to develop environmentally responsible behavior. Although the existing literature presents information about how to develop environmentally responsible behavior, only few studies seem to be carried out regarding kindergarten children. In fact, there is no predefined theoretical framework that explains how environmental education should

be integrated into early childhood education (ECE), and which methods should be used even though both of these two fields of education advocate a holistic approach and use similar educational and assessment methods (NAAEE, 2010).

The reasons underlying lack of research on environmental education within early childhood education can be attributed to the abstract and complex nature of environmental concepts which cannot be observed and experienced firsthand owing to the fact that early childhood children are merely in their pre-operational stage (2-7 year-old child) of Piaget's theory of cognitive development (Elliot & Davis, 2009; UNESCO, 2008). However, the results of several studies indicated that children between four and six years of age are capable of understanding environmental concepts, such as waste, garbage, recyclables and non-recyclables as well as environmental issues and problems, such as global warming, waste management and deforestation (Palmer, 1999; Palmer, Bajd, Duraki, Razpet, Suggate, Tsaliki, Paraskevopoulos & Skribe-Dimec, 1999; Palmer & Suggate, 2004). Even though children in their early childhood can consider environmental concepts and issues in a more complex way than many researchers and educators may think, the analysis of international studies on early childhood education and environmental education still draw attention to the lack of studies in this field (Davis, 1998; 2009; Elliott & Davis, 2009). Davis's (2009) preliminary literature survey, comprised of several Australian and international research journals on early childhood education and environmental education between the years 1996 and 2007, shows that only few studies have been conducted in this field. Most of them are related with young children in outdoor activities (education in the environment) but fewer studies focus on young children's understandings of environmental topics and issues (education about the environment), and there is almost no study investigating what young children know, what they can understand and what they can do as regards environmental problems and issues (education for the environment). Davis attributed the lack of such studies, early childhood education researchers' minimal attention to environmental issues and environmental education, and researchers' low level of interest in very young children and their educational settings to young children's limited verbal and writing

skills, which makes data collection difficult and expensive. Davis also added that it is difficult to obtain the required parental and institutional permission to work with young children.

In Turkey, a study conducted by Erdogan, Marcinkowski and Ok (2009) on environmental education with K-8 between 1997 and 2007 also indicated the existence of lack of research on children between 6 and 8 years of age. They also mentioned that available research focuses mainly on “knowledge of natural history and ecology (abiotic factors and matter cycles; and ecosystem and biomes)” and “socio-political knowledge (geographic pattern)”; however, there is no research associated with “knowledge of environmental problems and issues”, “affect” and additional determinants of behavior (“environmental sensitivity”, “environmental attitude”, “locus of control”, “personal responsibility” and “intention to act”) and “environmentally responsible behavior”. When the studies conducted after 2007 are examined, it can be observed that Turkish researchers generally aimed to identify preschool children’s perceptions, ideas, and knowledge about environment/ environmental issues and sustainable development, and attitudes toward environment/ environmental issues (Gülay, Yılmaz, Turan Güllac & Onder, 2010; Gülay-Ogelman, 2012; Kahrıman-Oztürk, Olgan & Tuncer, 2012; Kahrıman-Oztürk, Olgan & Güler, 2012; Taskın & Sahin, 2008). Based on the analyses, no research investigating the kindergarten children’s behaviors towards environment/ environmental issues and their predictors/ reasons has been conducted so far in the field of early childhood education. Hence, it is believed that the findings of this study will be a significant contribution to literature in providing a perspective to early childhood teachers, researchers and curriculum planners about how to integrate environmental education into the early childhood program and encourage researchers to study with preschool children, especially in the category of *education for the environment*. Thus, in the present study, which includes pre-implementation, implementation and post-implementation phases, the implementation process related to the 3Rs and composting is designed and applied to early childhood education as proposed by the North American Association for Environmental Education

(NAAEE) (2010) and Meredith, Cantrell, Conner, Evener, Hunn and Spector (2000). The 3R implementation is constructed by utilizing environmental educational models and various teaching methods [“field trip”, “creative drama (including role play, dramatization and teacher in role techniques)”, “storytelling”, “(educational/environmental) games”, “intergenerational learning” “inventorying and using community resources (guest speaker)”]. Through the implementation of the 3Rs, the three pillars of sustainable development, as well as three of the 7Rs, which are described by OMEP, are assumed to be promoted since OMEP advised that projects on the 7Rs can be set upon one, two or more of the Rs. Moreover, in 2010 the European Panel on Sustainable Development (EPSD) recommended that the projects had to be derived from the tangible local realities of preschoolers to create meaningful education for sustainable development and to improve the chances of success of education for sustainable development. These projects may also include issues both at the local and global levels as long as they remain meaningful to children, teachers and extended families. Hence, the present research focused on recycling including composting, reusing and reducing, which are not local but also global realities of children, their parents and their teacher. In other words, it is noteworthy to state that the implementation of the 3Rs also provides opportunities for the participants of the study to participate actively and effectively in the resolution process related to not only local but also global problems. Furthermore, intergenerational learning has also been included in the present study in order to describe the impact of implementation on home environment.

### **1.3 Purpose and Scope of the Study**

In the light of previous research and in line with the aim of OMEP (i.e., to increase the applicability of the 7Rs in early childhood education), the purpose of the present study was to apply qualitative research methods to seek whether a six-week 3R (recycle, reuse and reduce) implementation enhanced eco-management and persuasion behaviors (categories of environmentally responsible behavior) of kindergarten children attending eco-school at both school and home environments. In the present study, children’s eco-management behaviors, i.e. the 3Rs (recycling,

reusing, reducing) as well as making compost, which are all among the 7Rs, and their persuasion behaviors such as informing, demonstrating, doing, guiding, warning and encouraging their friends/parents/siblings/relatives about the 3Rs and making compost, which is sometimes categorized under recycling, were examined to determine the influence of the six-week implementation. Additionally, how the precursors of eco-management and persuasion behaviors exhibited by the kindergarten children were supported by activities throughout the implementation was investigated. To determine the influence of implementation on children's eco-management and persuasion behaviors and their precursors in their social environments (school and home), teacher and parents were also incorporated into the study. Moreover, the influence of the implementation on the alteration of parents' and teacher's ideas and the reflections of the implementation on their home environment were examined.

In summary, the current study assumed three specific purposes:

- 1) To investigate how the 3R implementation influenced kindergarten children's eco-management and persuasion behaviors as part of environmentally responsible behavior within the home and school environments;
- 2) To investigate how the precursors of eco-management and persuasion behaviors as part of environmentally responsible behavior exhibited by kindergarten children within the home and school environments were promoted throughout the implementation; and
- 3) To investigate how the 3R implementation influenced the children's parents' and their teacher's view and its reflections on their home environments.

### **1.3.1 Problem Statements of the Study**

The following main and sub research questions guide the overall study.

1. How does the 3R (recycle, reduce and reuse) implementation influence kindergarten children's behaviors in relation to the 3Rs as part of environmentally responsible behavior?

a) To what extent does the 3R implementation influence kindergarten children's eco-management behaviors within both the school and home environments?

b) To what extent does the 3R implementation influence kindergarten children's persuasion behaviors within both the school and home environments?

2. How does the influence of the 3R implementation on precursors of kindergarten children's behaviors in relation to the 3Rs as part of environmentally responsible behavior differ within the home and school environments?

a) To what extent does the 3R implementation influence the precursors of eco-management behaviors exhibited by the kindergarten children within both the home and school environments?

b) To what extent does the 3R implementation influence the precursors of persuasion behaviors exhibited by the kindergarten children within both the home and school environments?

3. What are the parents' ideas regarding the 3R implementation and their reflection on their home environment?

4. What is the teacher's idea regarding the 3R implementation and its reflection on her home environment?

#### **1.4 Definition of Important Terms**

**Environment:** It is comprised of both the biophysical environment and socio-cultural environment. Biophysical environment is described as “the biological and physical aspects of environment with which human interact and form which we obtain life supporting sustenance and natural resources”. The socio-cultural environment is described as “social systems within which individuals and groups with different cultures participate and interact” (Roth, 1970 as cited in Hsu, 1997 p.19)

**Sustainable Development:** It is “development that meets the needs of the present without compromising the ability of future generations to meet their needs.” It includes two significant concepts: a) “the concept of needs, in particular the essential needs of the World’s poor, to which overriding priority should be given; and b) the idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs” (World Commission on Environment and Development [WCED], 1987, p. 43).

**Composting:** “Composting is the biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture” (United Nations Environment Programme [UNEP], 2005, p.197). It is considered as a source reduction behavior and a different strategy from recycling, which aims to reduce the amount of biodegradable waste going into landfill sites (Edgerton, McKechnie & Dunleavy, 2009).

**Recycling:** It refers to the reprocessing of the waste packages throughout the production process either for their original aims or for other aims, including composting, but excluding energy recovery (The Ministry of Environment and Urban Planning, 2011). Even though composting and recycling have been classified as waste-reduction behaviors, in recent years, it has been accepted that they are conceptually distinct from each other (Edgerton, McKechnie & Dunleavy, 2009).

**Waste Package:** Packaging is used for the delivery of products to consumers, and after the product has been used or its expiry date has run out, it becomes waste material. Waste package also includes reusable waste and the packaging waste (secondary and transportation waste packages), which are thrown away and left around in the environment (The Ministry of Environment and Urban Planning, 2011).

**Environmentally Responsible Behavior:** In this study, it is defined as any behavior that aims at either preventing environmental problems or resolving environmental issues classified into five categories, namely eco-management, consumer/economic action, persuasion, political action and legal action (Marcinkowski & Rehring, 1995 as cited in Hsu, 1997).

**Eco-Management:** It is one of the categories of environmentally responsible behavior referred to as physical action. In the current study, it means recycling, reusing, reducing (3Rs) and composting organic matter such as leaves and vegetable wastes.

**Persuasion:** It is one of the categories of environmentally responsible behavior and in the current study it includes the following behaviors: talking to friends/parents/siblings/relatives about the 3Rs, including making compost, and encouraging them to do the 3Rs, including making compost.

**Environmental Attitude:** Environmental attitude is described in this study as “the psychological emotion and the positive or negative evaluation made as an individual engages in certain behavior” (Chen & Tung, 2010, p.827).

**Locus of Control:** In this study, locus of control is described as an individuals’ perception of his/her ability to impact on the solution and prevention of environmental problems. This predictor is categorized as internal and external locus of control (Peyton & Miller, 1980). While a person with an internal locus of control believes that his/her own action can bring about change, a person with an external



locus of control feels that his/ her action is unimportant, and change can only be brought about by powerful others.

**Personal responsibility:** Personal responsibility is defined as personal obligation or a sense of duty to implement actions (Boerschig & De Young, 1993). Moreover, it is described as individuals' feelings of duty or obligation and is constructed under personality factors that affect one's desire in the Hines Model of Responsible Environmental Behavior (REB) (Hines et al., 1986/87). They state that environmental responsibility includes a sense of obligation toward the environment as a whole or only solutions of environmental problems.

**Intention to Act:** Intention has been viewed "as the conative component of attitude and it has usually been assumed that this conative component is related to attitude's affective component" (Fishbein & Ajzen, 1975, p.289). Intention to act is one of the important variables taking place in the model of Hines et al., (1986/87). It also takes part as one of the empowerment variables in Environmental Behavior Model, which are significant for the training of responsible citizens in environmental education (Hungerford & Volk, 1990). Additionally, they assert that this precursor is closely linked with both perceived skill in taking action and locus of control.

**Personal Investment:** Personal investment, which is a crucial factor in the ownership variables category, may share a synergistic relationship with the intent to act, and it is explained that an individual identify themselves strongly with the issue since s/he has a personal interest in it. This interest can be derived from environmental consequences and/or economic consequences (Hungerford & Volk, 1990). Moreover, Monroe (2003) claims that this predictor may increase the possibility that a sense of obligation (personal norm) will influence the desire to act.

**Environmental Knowledge:** Environmental knowledge includes both individual's knowledge on ecological behavior and factual knowledge (e.g. knowledge on ecological concepts, knowledge of environmental problems and issues and knowledge of action strategies) (Hines et al., 1986/87). Furthermore, environmental knowledge is divided into three parts in the Environmental Behavior Model, namely

knowledge of ecology, in-depth knowledge and knowledge of environmental action strategies, and each type of knowledge takes place under three different variable categories, respectively, entry-level variable, ownership variables and empowerment variables (Hungerford & Volk, 1990). For both models, it is claimed that environmental knowledge emerges to be prerequisite to action. Moreover, Hornik et al., (1995) found that knowledge of recycling was observed to be strongest predictors of recycling behavior.

**Situational Factor:** This variable includes economic constraints, social pressure, opportunities and barriers that counteract or strengthen the environmentally responsible behavior and its precursors (Hines et al., 1986/87; Kollymuss & Agyeman, 2002).

**Environmental Education:** Environmental education is defined as “the interdisciplinary process of developing a citizenry that is knowledgeable about the total environment in its natural and built aspects and has the capacity and commitment to insure environmental quality by engaging in inquiry, problem solving, decision-making and action” (Landers, Naylor, & Annette, 2002, p.5).

**Early Childhood Education:** An education program is “any group program in a center, school or other facility that serves children from birth through age 8” and comprises “child care centers, family child care homes, private and public preschools, kindergartens and primary-grade schools” (Bredekamp & Copple, 1997 p.3).

## **CHAPTER II**

### **LITERATURE REVIEW**

This chapter focuses on related literature review that describes the theoretical framework concerned with the aim of this study. In this chapter, the need for environmental education, research on environmental education and environmentally responsible behavior, teaching strategies used in environmental education, historical roots and development of environmental education in Turkey, and research on early childhood education related to environmental education are presented respectively.

#### **2.1 The Need for Environmental Education**

Earth is around 4.5 billion years old and life on it has subsisted for more than 3.5 million years (Palmer, 1998). Palmer stated that human beings have existed on it for some 2 to 3 million years and for the majority of that time human beings survived with other forms of life in concert or sustainable stability. However, in the last two centuries, after the industrial revolution, human activity has had significant effects on the environment and environmental resources. Especially, in late twentieth century, this effect has become exceedingly severe, and is accelerating from day to day with the influence of increasing human population and consumption (Davis, 1998; Palmer, 1998; Schultz, 2002). Hence, humanity has also been exposed to crucial problems, most of which have been created by human beings' impact on local, regional and global environments, and with social and economic development in recent years. These problems lead to "the Earth's limited natural resources being consumed more rapidly than they are replaced, and to an increase in the effects of global warming upon ecological balance and bio-diversity"(Siraj-Blatchford, 2009, p.9). These negative outcomes can be overcome by ensuring change in the life style of people as individuals. For instance, governmental organizations should encourage individuals to behave in an environmentally friendly manner such as using public transport, reducing water consumption, saving water and energy (Department of the

Environment, Transport and the Regions, 2000). Among them household waste production has become a growing concern for not only developing but also developed countries in the world (Barr, 2007). Normally, the waste is disposed via either incineration or landfill sites, which cause crucial environmental problems pertaining to environmental pollution. To reduce the amount of waste that is disposed, several solutions are put forward, one of which is to encourage people to separate recyclable products from their regular household waste. Another solution is to encourage individuals to get involved in home composting to reduce the amount of biodegradable waste that goes to landfill sites (Edgerton, McKechnie & Dunleavy, 2009). These solutions were also recognized by the United Nations (United Nations Conference on Environment and Development, 1992) at the Rio de Janeiro Conference in the early 1990s, with the statement “successive levels of governmental structure around the world have sought to make progress on reducing the amount of waste sent to landfill” (Barr, 2007 p.436). In this respect, individuals’ determination related to what to buy, how to buy and how to dispose have a significant role in the struggle with waste problems effectively. As recommended in UNESCO’s first Intergovernmental Conference on environmental education, which was held in Tbilisi in 1977, broader implementation of environmental education in formal and non-formal education should be designed to overcome these problems. The Final Report of this conference also included a declaration about the aim of environmental education, which was stated as being successful in making people and the society comprehend the sophisticated structure of the natural and constructed environments arising from their biological, physical, social, economic and cultural interactions and gaining information, merit, appropriate manners and ability to take responsibility in understanding and solving environmental problems and environmental quality control (UNESCO, 1978). In addition, the goals, objectives and guiding principles of environmental education were described as follows:

- 1) to foster clear awareness of, and concern about, economic, social, political and ecological, interdependence in urban and rural areas;
- 2) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;
- 3) to create new patterns of behavior of individuals, groups and society as a whole towards the environment (UNESCO, 1978, p.26).

Moreover, the categories of the objectives in the conference final report were summarized in the following way:

Awareness: to help social groups and individuals acquire an awareness of sensitivity to the total environment and its allied problems

Knowledge: to help social groups and individuals gain variety of experience in, and acquire a basic understanding of the environment and its associate problems

Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection

Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems

Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels of in working toward resolution of environmental problems (UNESCO, 1978, p. 26-27).

The crucial influence of the Tbilisi event and the following publications on environmental education were to encourage the development of environmental education and related policies in many countries of the world today. Ten years after the Intergovernmental Conference was held in Tbilisi, UNESCO and UNEP collaboratively arranged the Intergovernmental Conference on Environmental Education and Training in Moscow in 1987 to draw attention to and raise awareness of environmental problems since attempts made by many countries could not prevent the decrease and the worsening of the quality of the environment. Worse yet, pollution problems at not only global but also local level increased, environmental risks augmented, the problem of poverty and gap between develop and developing countries gradually enlarged (UNESCO, 1987). Hence, in the conference document, an international strategy was constructed for the nations to plan their own national action strategies for the needs and priorities of environmental education and training for the 1990s (Sato, 2006). What's more, in the same year, in 1987, the report

entitled *Our Common Future*, known as The Brundtland Report, was published by the World Commission on Environment and Development. This report aimed to examine the state of the world and to propose methods to overcome the problems in the world concerning unsustainable developments. Therefore, the recommendations in this report, which were within the principle of Environmentally Sustainable Development, such as sustainable management of the Earth's sources and critical sustainable development policies, were declared (Bruntland, 1987). In addition, in this report the term "sustainable development" was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (WCED 1987, p. 43).

In 1991, the International Union for Conservation of Nature (IUCN), the United Nations Environment Programme (UNEP) together with the World Wildlife Fund (WWF) published "Caring for the Earth: A Strategy for Sustainable Living", comprised of three main parts to highlight the significance of protecting nature and natural resources. The first part, known as 'The Principles for Sustainable Living', described the principles that led the way to how sustainable societies could be created and continued with recommended activities about this. The second part, called 'Caring for the Earth', included additional actions for sustainable living, which focused on the necessities pertaining to the major parts of human activity and some of the main components of the biosphere. The last part presented a series of aims with reachable, expected tangible steps to be taken up on some particular dates, such as "targeting the incorporation of environmental education in school curricula in all countries" in 2005 (IUCN, UNEP & WWF, 1991).

In other words, according to the above-mentioned conferences and reports, which enabled the initiation of ongoing discussions on environment and sustainable development and evolved the concepts of environmental education, forming the life style of sustainable development at not only the national but also the international level was possible if environmental education was designed and integrated into the school curricula in the world.

The second international conference, The Earth Summit, in which the evolution of the concept of environmental education was seen, was held in Rio de Janeiro, Brazil, in 1992 with a considerably broader involvement of the United Nations on Environment and Development. Five significant documents, which referred to the starting of a long-term process, including inferring, reacting to and applying recommendations and agreements constructed to alter the future of the Earth, were signed at the Summit. The centerpiece of the Rio agreements was the *Agenda 21* main action program, which indicated what nations should do to accomplish sustainable development in the 21th century. This agenda contained 40 chapters, whose concepts ranged from poverty, managing solid waste and sewage, atmosphere and climate to youth and education. Although there are insinuations for environmental education throughout this document, particular importance was given to Chapter 25, on Children and Youth in Sustainable Development, and Chapter 36, on Promoting Education, Public Awareness and Training. For instance, in Chapter 25, the part on Children in Sustainable Development emphasized the importance of the role of children in sustainable future as follows:

Children not only will inherit the responsibility of looking after the Earth, but in many developing countries they comprise nearly half the population. Furthermore, children in both developing and industrialized countries are highly vulnerable to the effects of environmental degradation. They are also highly aware supporters of environmental thinking. The specific interests of children need to be taken fully into account in the participatory process on environment and development in order to safeguard the future sustainability of any actions taken to improve the environment (United Nations, 1992, p.200).

Besides, Chapter 36, organized with the principles presented in the Tbilisi Conference in 1977, highlighted the crucial impact of not only formal but also non-formal education on individuals' environmental literacy, and thus, on sustainable future with the following words:

Education is critical for achieving environmental and ethical awareness, values and attitudes, skills, and behavior consistent with sustainable development and for effective public participation in decision making. Both formal and non-formal educations are indispensable to changing

peoples' attitudes so that they have the capacity to assess and address their sustainable development concerns (United Nations, 1992, p. 264).

Five years after the Rio (1992) and twenty years after the Tbilisi (1977) conferences, another conference entitled 'The International Conference on Environment and Society: Education and Public Awareness for Sustainability' was held in Thessaloniki, Greece in 1997 by UNESCO with the purpose of stressing the crucial role of education in accomplishing sustainability and promoting thought on the significant contribution of environmental education in order to stimulate and promote more actions at international, national and local levels (Scoullou & Malotidi, 2004). According to Scoullou and Malotidi, in this conference, education and public awareness were brought to the center of the international community. Moreover, in this conference the reorientation of education to promote sustainable development was brought up and this issue was given place in the declaration as follows: Reorientation of sustainability education includes all ranges of education such as formal, non-formal and informal education all over the world. The understanding of sustainability has started to encapsulate environment and poverty as well as population, health, food security, democracy, human rights and peace. Consequently, sustainability is moral and ethical indispensability and people should be sensitive to cultural variety and traditional information regarding the sustainability issue (UNESCO, 1997).

After the conference in Thessaloniki, importance attached to education for sustainable development increased gradually in other international and national conferences and meetings. These advancements led to the international application of education for sustainable development, and in 2002, United Nations General Assembly declared the Decade on Education for Sustainable Development (UNDESD) for the period 2005-2014 (UNESCO, 2005). This declaration highlighted once more the key role of education for accomplishing and realizing sustainable development. In addition, this document addressed such educational principles and concepts as "interdisciplinary and holistic", "values-driven", "critical thinking and problem solving", "multi method", "participatory decision making", "applicability"



and “locally relevant” (OMEP, 2011). The influence of the declaration was observed in educational sectors including schools, universities, and technical colleges, and it was considered a determined effort to increase the awareness of and the amount of research on environmental education/ sustainability education, including Sustainable School initiative (Australia), the Green School Project (China), enviro-schools (New Zealand), Green Schools (United States) and eco-schools (Europe) (Davis, 2010; Elliot & Davis, 2009). Eco- schools, the biggest internationally-based initiative, were comprised of several members from 48 countries including Turkey (Henderson & Tilbury, 2004). Additionally, during this period, in 2007, the first international workshop, the most important event in terms of early childhood education (ECE) took place with the attendance of thirty-five participants from sixteen different countries. The first international workshop on education for sustainable development (ESD), “The Role of Early Childhood Education for a Sustainable Society” was organized in Goteborg, Sweden with especially young children (Pramling-Samuelsson & Kaga, 2008). This was a follow-up to the international conference for sustainable development, “Learning to Change Our World”, in 2004, in Goteborg. The purpose of this workshop was to discuss promoters and obstacles regarding learning for sustainability. In this meeting, participants reached a strong consensus that education for sustainable development should start from very early years since “children develop their basic values, attitudes, skills, behaviors and habits which may be long lasting” in early childhood years (Pramling-Samuelsson & Kaga, 2008, p.12). Some of the recommendations proposed by the participants are 1) invest more in early childhood education to make individuals reach qualified early childhood education easily, 2) involve children in sustainability education at early ages, 3) being mindful about the support of early childhood education in forming a sustainable community and 4) integrating it in early childhood curriculum. Moreover, the recommendation of integrating it in early childhood curriculum includes a) content that is sensitive to culture and context, b) content that develops positive and mindful behaviors toward nature and other people in the world, c) development of respect for variety d) education about gender, equalities and rights of both boys and girls e) development of fundamental life skills, f) the concept of

learning for living and sustainably, g) exercises about 7Rs: “Reduce, Reuse, Repair, Recycle, Respect, Reflect and Refuse” (Pramling-Samuelsson & Kaga, 2008).

After this workshop, in 2008, another meeting was arranged with the involvement of researchers from early childhood education and colleagues from other education and policy sectors in order to compose the document called *The Gothenburg Recommendations on Education for Sustainable Development*. In this document, Recommendation1, “Access for all to a Process of Lifelong Learning”, emphasized that “early childhood is a natural starting point for education for sustainable development in order to promote educational access for all people within a process of lifelong learning”(p.7). Davis (2010) also declared that this is a noteworthy statement since it was the first time early childhood education had been given place in an international education for sustainability document.

Additionally, in 2010, OMEP changed and developed the 7Rs that were identified in the international workshop entitled “The Role of Early Childhood Education for a Sustainable Society”. The new 7Rs have been arranged in such a way that they now include the three pillars of education for sustainable development, namely social and cultural development, economic development, and environmental protection. The new 7Rs which are “Reduce, Reuse, Respect, Reflect, Rethink, Recycle and Redistribute” are described and explained as follows (Duncan, 2011; OMEP, 2011):

*Respect – the rights of the child (related to the socio-cultural pillar)*

This is about learning to be keen on nature, and to respect nature, but also to respect children and their capabilities. Here it is important to be able to speak to children about the living conditions of other children without instilling attitudes of pity towards those living abroad.

*Reflect – on cultural differences in the world (related to the socio-cultural pillar)*

This is about giving children a chance to reflect on how their peers in other countries live. To universalize the issues it helps to bring up the consumption

mentality, and to point out factors like the role of different climactic and weather conditions elsewhere. Using music as a means of communication is effective.

*Rethink – the changes in people’s values over time (related to the socio-cultural pillar)*

This is about challenging children to be creative, e.g. by using drama in role-modeling positive and productive attitudes.

*Reuse – by finding new uses for old things (related to the environmental pillar)*

This is about suggesting creative ways of not wasting resources. This might be as simple as advising children to draw on both sides of a piece of paper, or could involve establishing an ‘exchange corner’ where parents can bring things their children don’t need any more and take things other children no longer need. Parents could also bring in used ‘raw materials’ from which children can make new products, like musical instruments or decorations from empty cans or birdhouses from old computer parts.

*Reduce – by doing more with less (related to the environmental pillar)*

This involves educating children to be mindful of what they use, such that they think about whether they really need something before buying/consuming it.

*Recycle – so that waste materials can be remade into something usable (related to the economic pillar)*

This involves sorting waste in order to identify materials that can be repurposed—for example teaching a child how to construct something using scrap wood or waste-as-art projects. This principle also encompasses the notion of composting, and children can participate in the process of how organic waste can be converted into compost for use in a garden.

*Redistribute – resources so they can be used more equally (related to the economic pillar)*

This includes donating toys to non-profit organizations or charities during the holiday season or enrolling in solidarity action projects through bilateral exchange with preschools in other parts of the country/undeveloped and/or developing countries.

After the description of new 7Rs, 28 countries including Turkey from five different regions, namely Africa, Asia Pacific, Europe, Latin America, and North America and the Caribbean accepted to be involved in the project in 2010. However, only 13 countries, excluding Turkey, were able to send the report of the statistical results of their projects. According to the results, OMEP has determined its agenda to extend and to maintain the education for sustainable development project in an attempt to increase the applicability of the 7Rs in early childhood education (OMEP, 2011).

Furthermore, *the North American Association for Environmental Education (NAAEE)* published the *Early Childhood Environmental Education Programs: Guidelines for Excellence*. These guidelines included a set of recommendations to develop and manage high-quality environmental education programs for children from birth to eight years old. This program, however, focused specifically on three-to-six- year olds. This program also presented a tool that could be used to provide the basis for new programs or to lead to improvements in the existing ones (NAAEE, 2010).

To conclude, all the above-mentioned documents indicated that even though environmental education / education for sustainable development had developed since early years was believed that environmental education / education for sustainable development should be part of all sectors of education, unfortunately environmental education / education for sustainable development has only started to take place in early childhood education in recent years. There have been several attempts to make applications related to education for sustainable development prevalent at not only the national but also the international level; however, these are still insufficient. Hence, stakeholders, i.e. researchers, educators, governments, non-

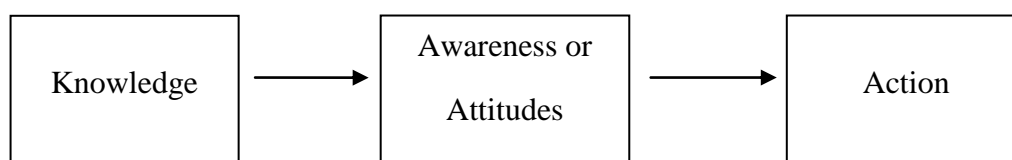
governmental organizations (NGOs), have to make much more effort than they are doing so today to increase the contribution of early childhood education to a sustainable future in terms of environmental education/education for sustainable development.

## **2.2 Research on Environmental Education and Environmentally Responsible Behavior**

In this section of the literature review, “the aims of environmental education”, then “the relationship between environmental education and environmentally responsible behavior” and lastly, “teaching methods used in environmental education” are explained in detail.

The examination of the development process of environmental education especially at an international level reveals that the major outcome of environmental education is to raise “*environmentally literate citizenry*” since environmental education encourages the individuals to develop awareness, knowledge and attitudes concerning the environment to gain skills and motivation in order to be active citizens to solve environmental problems and to participate actively in protecting and improving the environment (Hsu, 1997). This outcome is recognized by many educators and researchers as the ultimate goal of environmental education (Culen, 2001; Disinger, 1983; Hungerford & Volk, 1990; Simmons, 2000; Stapp, 1969; Stapp, 1978). The expression of environmental literacy (EL) has been used for more than half a century; however, it has not been described precisely (Disinger & Roth, 1992). Roth (1992) defined environmental literacy as “the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore or improve the health of those systems”. He explained it “as a continuum of competencies ranging from zero competencies to very high competency that can be functionally divided into three working levels-nominal, functional and operational literacy” (p.17). In addition, Roth (1992) considered that environmental literacy contains perceptions, skills, attitudes and habits of minds that would promote long-running actions for sustainable development. He also advocated

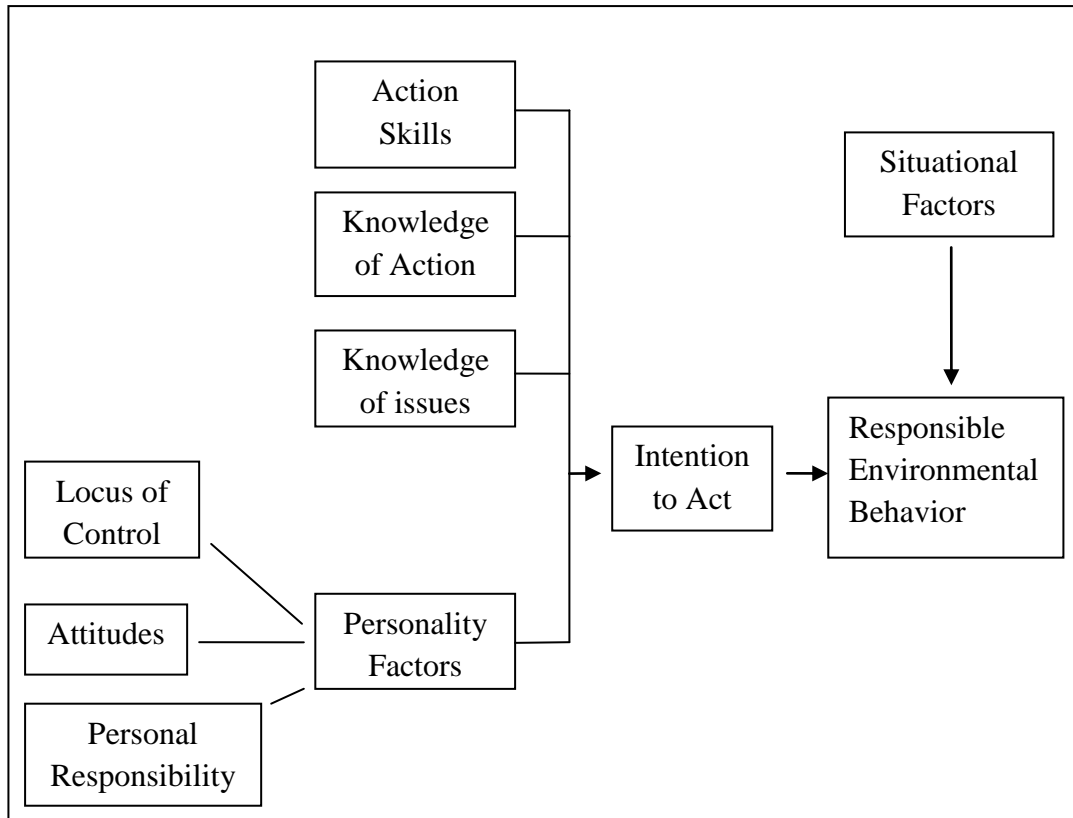
that environmental literacy should be described in terms of observable behavior, which is later entitled as responsible environmental behavior (REB) or environmentally responsible behavior (ERB) (Erdogan, 2009). Likewise, the utmost purpose of environmental education is to develop environmentally responsible behavior and raise an environmentally responsible and active future generation as proposed in Tbilisi and confirmed by many researchers (Borden & Schettino, 1979; Gotch & Hall, 2004; Hungerford & Volk, 1984, 1990; Leeming, Dwyer, Porter & Cobern, 1993; Ramsey & Hungerford, 1989). Nonetheless, the major issue for educators is to transfer this aim into instructional reality. Therefore, several models were proposed by researchers to perceive how education can promote environmentally responsible behavior and its precursor variables. Early studies and traditional thought advocated a linear relationship among environmental knowledge, attitude and behavior (Scoullos & Mlotidi, 2004) and claimed that when one's ecological knowledge level increases, his/her awareness related with the environment and its problems develops, which, in turn, leads to a change in his/her attitudes, and thus, s/he behaves more responsibly toward the environment (Ramsey & Rickson, 1977). In other words, they declared that the more knowledgeable people are about the environment, the more they are inclined to develop responsible behavior toward conserving the environment and handling environmental problems. This linear relationship is demonstrated by Hungerford and Volk (1990) in their model as in Figure 2.1.



*Figure 2.1* [Theorized] Behavioral change system (source: Hungerford and Volk, 1990, p.9).

Later, research into environmental behavior demonstrated that this linear model for changing behavior did not hold true (Hungerford and Volk, 1990) since the results of Kibert's study (2000) revealed that the relationship between knowledge

and behavior is not significant. In other words, increase in knowledge solely was inadequate in changing behavior. Hence, another model was proposed by Hines, Hungerford, and Tomera (1986–87) after a meta-analysis with 128 empirical studies examining the variables which were strongly correlated with environmentally responsible behavior. The outcomes of their analysis demonstrated that fifteen separate variables were associated with environmentally responsible behavior. As opposed to traditional models advocating that environmental knowledge was the significant predictor of behavior, Hines' model of responsible environmental behavior (Hines et al., 1986/87) specified "intention to act" as a main predictor of behavior. In addition, they drew attention to the fact that "intention to act" was affected by various variables such as cognitive knowledge, cognitive skills and personality factors. In other words, if an individual had insufficient knowledge about environmental problems and of action strategies (skills) related with the given problem, s/he would not intend to act. Moreover, in order to intend to act, an individual must have the desire to act, which is influenced by the personality factor (locus of control, attitude and personal responsibility). They also mentioned situational factors, including economic constraints, social pressures and opportunities, since these factors may impact environmentally responsible behavior by either strengthening or counteracting the variables in the model (Hines et al., 1990). Figure 2.2 displays the model of environmentally responsible behavior prepared by Hines et al. (1986–87).



*Figure 2.2* The proposed model of responsible environmental behavior (Hines et al., 1986/87, p. 7).

What's more, inspired by the Hines Model of REB and subsequent research pertaining to this model, the Environmental Behavior Model was proposed by Hungerford and Volk in 1990. This model is displayed in Figure 2.3.



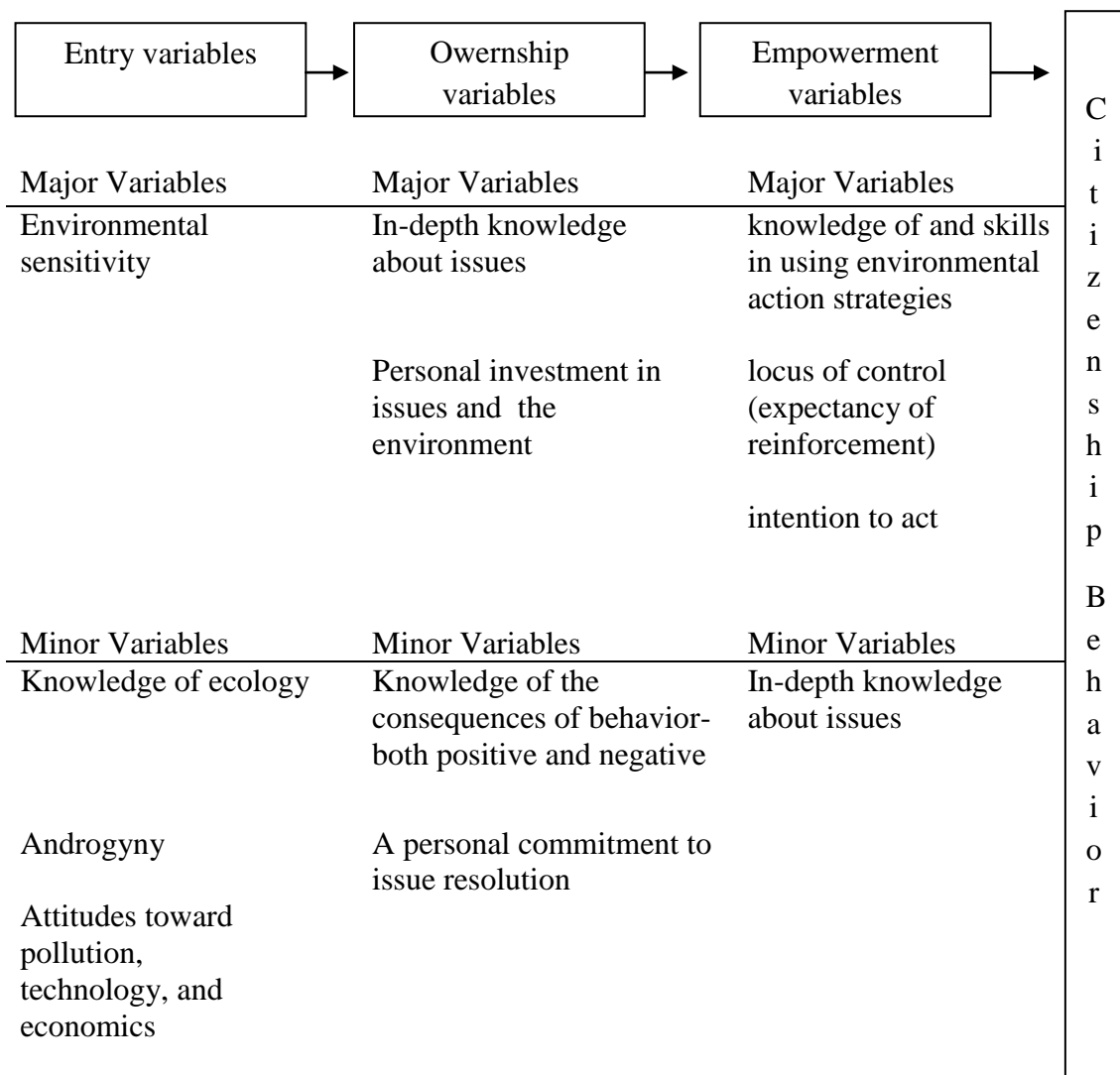


Figure 2.3 Environmental behavior model: Major and minor variables involved in environmentally responsible behavior (Hungerford & Volk, 1990, p.260).

In this model, Hungerford and Volk (1990) enlist seven variables under three categories. These categories are as follows: 1) Entry level variables, 2) Ownership variables, and 3) Empowerment variables. Entry level variables are important predictors of behavior and include precondition variables (environmental sensitivity, androgyny, knowledge of ecology and attitudes towards the environment and environmental issues) promoting individual's decision-making before an action. Ownership variables (personal investment in environmental issues, in depth knowledge about issues, knowledge of the consequences of behavior, personal

commitment to issue resolution) internalize environmental issues through the development of knowledge and investment. Empowerment variables are regarded as a milestone of teaching in environmental education to motivate individuals to feel that they have the ability to change and participate in the process of overcoming environmental problems and issues. These variables include knowledge of using environmental action strategies, skills in using environmental action strategies, locus of control and intention to act. According to this model, an individual is more likely to behave responsibly towards the environment when if s/he shows development in many of these variables. However, only some of these variables are teachable, and thus, these should be a crucial part of environmental education (Mony, 2002).

Environmentally responsible behavior has also been classified into different categories in the existing literature (Erdogan, 2009). After corroboration and review by the Environmental Literacy Assessment Consortium, Marcinkowski and Rehring, (1995 as cited in Hsu, 1997, p.38-39) identified five categories of environmentally responsible behavior: eco-management, consumer/economic action, persuasion, political action and legal action. The definitions of these categories are summarized in Table 2.1 below.

Table 2.1

*Categories of Environmentally Responsible Behavior*

Categories of environmentally responsible behavior	Definition	Example
Eco-management	environmental actions in which people work directly with the natural world to help prevent or resolve environmental issues	recycling, reusing ,reducing, tree planting, picking up litter or other waste types, creating habitat for native plants and animals, composting organic matter such as leaves and vegetable wastes
Consumer/Economic Action	environmental actions in which people use monetary support or financial pressure to help prevent or resolve environmental issues	preferring to buy the products that can be easily recycled or recycled products boycotting certain goods or buying eco-friendly products, buying only soft drinks which are packaged in recyclable containers, refusing to purchase products made by companies with negative environmental records, purchasing prepared food from vendors who use a minimum of packaging
Persuasion	environmental actions in which individuals or groups appeal to others help prevent or resolve environmental issues	talking to a friend/,parents/siblings/relatives about recycling and encouraging them to recycle writing an environmental letter to be published in the local newspaper, making and putting up posters urging people to recycle used food containers, convincing parents to purchase foods which come in environmentally-appropriate packaging
Political action	environmental actions in which people use political means to help prevent or resolve environmental issues	wanting recycle bins from local governments writing a letter to a legislator, writing a legislator supporting the passage of an environmentally-appropriate law, campaigning for a candidate with a good environmental record, voting for a pro-environmental candidate, appearing before a city council and requesting a recycling center for the community
Legal action	environmental actions in which people use to support or enforce existing laws which are designed to help prevent or resolve environmental issues	reporting violations of existing laws to authorities

To sum up, researchers in the field of environmental education have constantly drawn attention to environmental problems and their resolutions that generate the major reason for the formation of the characteristics and aims of environmental education (Stapp, 1969; Hart, 1981; Disinger, 1983; Simmons, 1995). The requirement of behavior -hereafter referred to as “responsible environmental behavior” (REB)- is equivalent to other terms which emerge in the literature, such as pro-ecological behavior, pro-environmental behavior, environmentally friendly behavior - to solve these problems is seen explicitly in the environmental education goals and objectives confirmed at the Intergovernmental Conference on environmental education, held in Tbilisi in 1977 (Marcinkowski, 1998; Osbaldiston & Schott, 2012). According to the report of the Ministry of Environment and Forestry (2010), the common environmental problems in Turkey were described as air pollution, water pollution, solid waste and unplanned urbanization. The major reason for environmental pollution is the deterioration of nature’s ability to remove the waste generated by human beings since the waste that is discarded into the air, water and soil destroys the nature’s physical, chemical and biological properties (Cevik, 1999). Although solid waste recovery has existed for a long time as a commercial activity in Turkey, public involvement and awareness in municipal recovery programs has been a major problem in all curbside/separate collection programs (Banar, Vardar, Malkoc, Sahin, Neyim & Eröztürk, 2001; Metin, Eröztürk & Neyim, 2003; Neyim, Metin & Eröztürk, 2001). In Turkey, not only to solve the waste problem but also to promote the prevalence of individuals’ participation in waste reduction behaviors such as recycling and composting, there is a need to change behavior (such as eco-management, persuasion...etc) of individuals, which can be ensured by means of environmental education as verified at Tbilisi: “The goals of environmental education are ... (c) to create new patterns of behavior of individuals, groups and society as a whole towards the environment” (UNESCO, 1978, p. 26). Hence, in the present study, only eco-management and persuasion categories of environmentally responsible behavior, specifically related to recycling, reusing, reducing (3Rs) and making compost, were studied to contribute to the solution of the waste problem in Turkey by supporting the predictors in

environmentally responsible behavior models and utilizing various teaching methods. Moreover, the following part summarizes major teaching strategies utilized across countries as attempts to enhance environmental education.

### **2.2.1 Teaching strategies used in environmental education.**

Hungerford, Volk, Dixon, Marcinkowski and Sia (1988) have proposed a set of teaching methods for implementing programs in environmental education. These methods were based on a set of goals and sub-goals for curriculum development in environmental education constructed by Hungerford, Peyton and Wilke (1980). Scoullos and Mlotidi (2004) devised a table that indicated goal domains and suggested methods. While constructing this table, a table called “a goal-oriented framework as a basis for organizing instructional methods and resources” which had already been designed by Hungerford, Volk and Ramsey (1994) and recent developments in environmental education were utilized (Table2.2).

Table 2.2

*Educational Goals, Learners' Objectives & Suggested Methods (Scoullos & Mlotidi, 2004, p.44).*

Goal Domain	Suggested Methods
<p><b>Awareness &amp; Knowledge</b>            ...to help students acquire awareness of the environment, social &amp; economic systems and the interdependence among them, as well as of the allied issues; and understand the complexity and interconnectedness of problems, such as environmental degradation, poverty, unsustainable patterns of production &amp; consumption, gender inequality, violation of human rights, at local, national and global level.</p>	<p>Lecture &amp; discussions            Bibliographic research &amp; use of modern ICTs            Experiments  <b>Field visits &amp; trips</b>            Case study            Surveys</p>
<p><b>Behavior, Attitudes &amp; Values</b>            ...to help students develop feelings of concern for the environment, society and the relationship between them; develop and strengthen values of respect of nature, equality, peace, tolerance and democracy; and develop motivation to be actively involved in protection and improvement of the quality of environment and of life, in particular of the unprivileged people, such as; poor, women, victims of racism, culture and ethnic minorities, etc.</p>	<p>Panel discussions &amp; debates            Surveys  <b>Role play</b>            Case study  <b>Field work &amp; research</b>            Projects carried out in cooperation with schools from other communities or even from other countries</p>
<p><b>Skills</b>            ...to help students acquire skills for investigating and identifying environmental, social and economic problems and addressing them through appropriate decision-making and action</p>	<p>Panel discussions &amp; debates  <b>Role play &amp; simulation</b>            Surveys            Problem solving approaches  <b>Projects</b></p>
<p><b>Involvement in creative action</b>            ...to provide students with opportunities, encouraging them to be actively involved in working collectively and individually towards addressing problems and issues in their community</p>	<p>Workshop with <b>community resource people</b>            Problem solving approaches            Projects carried out in cooperation with other schools, local institutions and community stakeholders.</p>

The effectiveness of these methods proposed by Hungerford, Volk and Ramsey (1994) and Scoullos and Mlotidi (2004) were supported by relevant literature and programs developed with the support of UNESCO. When environmental education programs were constructed, program developers/researchers

utilized many methods (Dimopoulos, Paraskevopoulos & Pantis, 2009; Grodzinska-Jurczak, Bartosiewicz, Twardowska & Ballantyne, 2003; Mueller & Bentley, 2009).

According to the teaching and learning strategies of a UNESCO program, “Teaching and Learning for a Sustainable Future”, outdoor education (including short trips to the school grounds, local community; field trips to farms, factories, science centers, forest national parks) presented high quality learning activities to students by providing them with first hand experiences. Also, students had a chance to apply skills of enquiry, values analysis and problem solving (UNESCO, 2001). In addition, these experiences helped to improve students’ self-confidence and feelings of safety, and thus, their desire to join future outdoor activities was affected positively (Palmberg & Kuru, 2000). In other words, these experiences had a significant impact on students’ environmental sensitivity, which was one of the precursors of environmentally responsible behavior (Chawla, 1998). The findings of several studies also stressed the importance of field trip as a method in environmental education (Carrier, 2009; Cachelin, Paisley & Blanchard, 2009; Farmer, Knapp & Benton, 2007). In fact, the results of Farmer, Knapp and Benton (2007)’s study demonstrated that the gained experience during field trip enabled students to develop a perceived pro-environmental attitude one year after the field trip.

Another line of research focuses on creative drama as a method providing opportunity for students to find solutions to problems, to apply these solutions throughout the drama process, to realize the outcomes of their solutions, to consider generating alternative solutions and also to try out these solutions, and thus, internalize these solutions (Hungerford, Volk & Ramsey, 1994) The effectiveness of drama in environmental education was supported by several studies (Akköse, 2008; Çokadar & Yılmaz, 2010; Littledyke, 1998; 2001; 2008, McNaughton 2004). For instance, the study conducted by Akköse (2008) illustrated that drama was an effective method to improve kindergarten children’s skills of cause-effect relationship related with natural events such as landslide, earthquake, formation of rain, snow etc. The outcomes of another study demonstrated that students understood

concepts of science related to health more easily, could draw more detailed pictures of the body, developed positive attitudes toward health and reasoned more effectively about environmental matters (Littledyke, 2001). In addition, results of other studies indicated that drama was an effective teaching method since it catered to the whole person in the learning process (Littledyke, 1998; McNaughton 2004). Furthermore, individuals can realize the environmental consequences of their actions through drama as drama activities help to discover the social and environmental impact of real and imagined plans on an area (Littledyke, 2008).

Another method included in the “Teaching and Learning for a Sustainable Future” program is storytelling because everyone, especially young people, enjoy listening a well-designed story and also, storytelling is a good way not only to amuse students, but also to draw their attention while learning significant notions, attitudes and skills (UNESCO, 2001). In addition, according to De Young and Monroe (1996) it was verified that instructing people on environmental issues and problems was much harder than enabling them to imagine these issues and problems first because environmental problems were often complex, abstract and overpowering. Hence, informing people about the problems that they had to struggle with via scientific explanation could make it difficult for them to understand these problems. The insufficient understanding caused people to avoid or deny the problems and feel helpless against them. However, explaining environmental problems by using stories was mostly welcomed by people and they were inclined to change behaviors more eagerly even if the problems were still comprehensive and overwhelming. Furthermore, using this method encouraged especially pre-school children’s curiosity and led them to think in a more complex and reasonable way about scientific concepts and facts (Hugerat, Eliyn & Zadik, 2005).

Researchers also highlighted the effect of “game (educational/environmental games)-playing method” on students’ skills, environmental attitudes and behaviors (Hewitt, 1997; Knapp & Poff, 2001; Vlastaris, 2003). A study was conducted by Hewitt (1997) to examine the impact of six environmental games related with wetlands, pollution, energy, world population, endangered species, and individual



effects on the environment on students' environmentally responsible behavior. The outcomes indicated that four of the six games had a significant effect on students' environmentally responsible behavior by giving them an understanding of environment and increasing their advocacy toward the environment. In addition, Knapp and Poff (2001)'s study highlighted the long-and short-term effect of games on students' affect. They drew attention to the fact that even four months after the implementation, students could remember the rules, time limits, and how to play the game easily. Therefore, educational games were believed to be a more "innovative" learning and teaching method in environmental education (Valastaris, 2003).

In recent years, researchers have started to investigate ways to support intergenerational learning in environmental education (Duvall & Zint, 2007). In other words, they began to design activities that necessitated the active involvement of parents in the learning process in environmental education because they thought while many environmental educators focused on children's becoming environmentally literate citizenships in the future, they overlooked the effect of parents and grandparents on not only children but also the environment and the impact of children on parents and other communities (Ballantyne, Connell & Fien, 1998; Duvall & Zint, 2007). In addition, many studies, especially those in marketing research, highlighted children's ability that influenced their parents' knowledge, attitudes, and behaviors and showed that children had a significant effect on their parents' consumer choices. Thus, they verified that children played a significant role in the decisions made by parents (Flurry & Burns, 2005; Roedder-John, 1999). Therefore, studies started to be conducted to examine distinct teaching methods that fostered intergenerational learning, such as booklet, interview, diary, hands-on activity, take-home activities, drama, story, interactive quiz, class discussion, homework, class discussion, worksheets, field trip, presentations, written report, class lecture, coloring books, homework (Sutherland & Ham, 1992; Uzzell, 1994; Leeming, Porter, Dwyer, Cobern & Oliver, 1997; Legault & Pelletier, 2000; Ballantyne, Fein & Packer, 2001a; Vaughan, Gack, Solorazano, & Ray, 2003). All of

these studies, except Legault and Pelletier (2000)'s study, found that these strategies had a significant effect on intergenerational learning.

The other method proposed by Hungerford, Volk and Ramsey (1994) as "inventorying and using community resources" was comprised of human resources (such as wildlife biologists, game wardens, botanists, commercial fishermen, waste disposal personnel, waterworks personnel, environmental organization activists, and ranchers/farmers) and physical resources (such as wildlife refuges and parks, national/state forests, farms, zoos, fish hatcheries, sewage plants, waterworks, garbage dumps (landfills), electrical utilities, fertilizer industries, toxic waste dumps, university facilities such as departments of fisheries and wildlife, local parks having environmental potential, environmental centers, and recycling centers). For instance, Emmons (1997) utilized human resources and invited guest speakers to provide an opportunity to students to work closely with environmental matters and realized the importance of becoming involved in the research process.

### **2.3 Historical Roots and the Development of Environmental Education in Turkey**

Table.2.3 presents the historical events related to environmental education in Turkey (Buhan, 2006; Erdogan, 2009).

Table 2.3

*Historical Events Related to Environmental Education in Turkey*

Important Dates	Event	Explanation
1961	Turkish Constitution in article 49	First time the term “environment” was used
1971	Third Five Year Development Plan, for the period between 1973 and 1977	First policy regarding environmental rights and protection
1978	The establishment of the Prime Ministry Undersecretaries for Environment (The Ministry of Environment and Urban Planning)	Coordination of national and international environmental activities
1982	Constitution, Article 56	“Everyone has the right to live in a healthy and balanced environment. Protection of environmental health, prevention of environmental pollutions, and development of the environment are the state’s and every citizen’s duty”
1983	The enactment of law 2872 in Article 56	Protection of environment and prevention of environmental pollution from the inappropriate usage of natural resources to waste management
1990	The approval of environmental education project for primary level by MONE in cooperation with UNESCO	Preparation of a handbook for primary school teachers
1993	The foundation of the Turkish Environmental Education Foundation (TURCEV)	Participation of Turkey in international environmental education programs such as the ‘Eco-School’ and ‘Young Reporters for the Environment’ programs
1994	Seventh Five Year Development Plan Environment Commission’s report	Stress of the significance of the environment and environmental education
1999	The Collaboration Protocol in environmental education by the Ministry of Environment and the Ministry of Education	Preparation of “new environmental education program” for students and teachers at various levels of formal education to develop their environmental sensitivity

One of the major steps on the development timeline was *the Collaboration Protocol in Environmental Education*, which was taken by the Ministry of Environment (currently known as the Ministry of Environment and Urban Planning) and the Ministry of Education on 14 October, 1999. The purpose of this protocol was to prepare a “new environmental education program” for students and teachers at

various levels of formal education to develop their environmental sensitivity. This program emphasized children's active participation in environmental education during early childhood education (ECE) and elementary education to develop awareness toward protection of environment (Buhan, 2006). This protocol also stressed the "protection of environment", "prevention of environmental pollution", "developing consumer habits in a positive way", "accumulating solid waste separately at its source" and "recycling" as the contents of environmental education, including active learning to carry out at particular schools in early childhood education and elementary education (Ministry of Environment, 1999). However, no curriculum regarding environmental education was developed in early childhood education in Turkey. Only special days and weeks in the curriculum included the concept of environment. In addition, environmental education was not given importance at K-3 (Kiziroglu, 2000). However, the purpose of environmental education was to protect nature and natural sources since it was crucial to have detailed knowledge about the environment including biosphere, biomes and ecosystems to understand how to protect abiotic (such as air, soil, water) and biotic components (such as plants and animals) (Ayvaz, 1998). He also stated that it was necessary to provide materials and learning environments that supported their sense, to carry out various activities and to give feedback to children not only in early childhood education but also in elementary education (Ayvaz, 1998). Furthermore, an "environment council" was established by the Ministry of Environment in 2000. In this council, the lack of environmental education in Turkey was emphasized and with the collaboration of the Ministry of Education, learning/teaching through activities, an approach enabling children to gain a positive attitude and behavior towards environment was adopted (Ministry of Environment, 2001).

### **2.3.1 Early childhood education and environmental education in Turkey.**

The impact of the above-mentioned developments in Turkey, together with the attempts regarding the integration of environmental education in schools' curricula abroad, led to an alteration in the Turkish elementary science curricula, including the early childhood education curricula (Erdogan, 2009). As far as early

childhood education curricula (3-6 year-old children) are considered, it was seen that early childhood education curriculum was subject to alterations in 2002 and in 2006 (still prevails) respectively. In 2002, for example, the early childhood education curriculum was comprised of “targets” (e.g. to be able to demonstrate positive attitudes toward living things and individuals with different characteristics) and “expected gained behaviors” (e.g. “to take care of the living organisms’ right to live”); these were either directly or indirectly related to the education of environmental awareness. The “targets” and “expected gained behaviors” can be used in various activities, such as art, drama and play activities toward environmental consciousness. In addition to the “targets” and “expected gained behaviors”, some new “goals” and “objectives” (that were replaced with “target” and “expected gained behaviors” in the 2002 curriculum) pertaining to environmental consciousness were added to the renewed early childhood education curriculum in 2006 (Buhan, 2006). These are: “Goal 12: to be able to protect the beauties in the environment and objectives (1) to tell the reasons of conservation of the beauties in the environment, (2) to explain what should be done to conserve the beauties in the environment, (3) to take responsibility to conserve the beauties in the environment” (MONE, 2006, p.28)

Another difference between the 2002 and 2006 curriculum is that, the former was based on the behaviorist approach and themes. In other words, there were themes that were defined in the yearly and monthly plans of MONE. These themes changed from month to month. In addition, activity corners (such as science and nature corner, book corner etc.) also changed monthly according to the themes. For instance, while the theme in October was related to the recognition of the environment where children lived and understanding of the functions of the events in their environment, in January the theme focused on energy conservation and on balanced diet. However, the 2006 curriculum is based on the constructivist approach; there are only goals (targets in 2002) and objectives (expected gained behaviors in 2002) for each developmental domain (such as social-emotional domain, cognitive domain etc.) that is described according to children’s ages. Further, educational activities are planned based on these goals and objectives by giving importance to

children's needs. This curriculum also supports children's learning process via various techniques and methods with more child-centered activities as opposed to the 2002 curriculum (Gelişli & Yazıcı, 2012). What's more, the teacher is free while selecting goals and objectives to plan activities.

In the 2006 curriculum, there are some special days and weeks related to environmental education, such as energy conservation week, the forest week, traffic and first-aid week, museums week and environment protection week, which are celebrated by children and teachers with some activities (Gulay & Ekici, 2010). Erdogan, Bahar, Ozel, Erdas and Usak (2012) compared the 2002 and 2006 Early Childhood Curricula in terms of environmental literacy (containing knowledge, skill, affect and behavior components). The results also indicated that several changes had occurred in the 2006 curriculum with respect to the arrangement of the curriculum and the consistency of the integration of the purposes of environmental education in the curriculum. For instance, behavioral implications were mostly met in 2002, whereas child-centered and constructivist implications were mostly met in 2006. Moreover, the 2006 curriculum was based on the construction of knowledge, the spiral design of the content, and process-oriented assessment and there was an increase in the number of objectives. In the 2002 curriculum, 27 of the 169 "expected gained behaviors" directly correlated with the components of environmental literacy (EL). In other words, only very few of the "expected gained behaviors" aimed to reach the components of EL. Also, most of them were related with the component of knowledge, fewer with skills, fewer with affect and behaviors. Additionally, no "expected gained behaviors" were related with the psychomotor domain. 6 of the 21 special days and weeks were associated with the aims of environmental education. On the other hand, only 34 of the 264 objectives were related with any component of EL in 2006. Although the number of objectives regarding the aims of environmental education increased in the 2006 curriculum, the proportion decreased comparatively since there was a very high increase in the total number of objectives in 2006. The number of objectives related with environmental education in the social-emotional domain and self-care skills increased, whereas the number of objectives in cognitive

and language domains decreased. In addition, no objectives were related with environmental education in the psychomotor domain as in the 2002 curriculum. Moreover, most of the objectives correlated with knowledge, fewer with skills, fewer with affect and behavior as in the 2002 curriculum. The comparison of the objectives in the 2002 and the 2006 curricula revealed that the number of objectives related with skills and behavior increased, while the objectives related with knowledge remained the same. Even though knowledge was a significant component of EL, sole knowledge was inadequate to perceive the environmental dynamics and compose a view to protect the environment (Maleki & Karimzadeh, 2011). Therefore, it can be concluded that all the components of EL should be considered and integrated into the curriculum (Erdogan, et.al, 2012)

To sum up, although early childhood education curriculum was improved and revised in 2006, environmental education did not receive enough attention in the early childhood education curricula (Akçay, 2006; Gulay & Ekici, 2010). According to Gülay and Ekici (2010), this can arise from lack of enough research related with environmental education in the area of early childhood education. Considering the significant effect of early childhood education on the development of children's attitude and behavior toward environment, environmental education in early childhood education should be planned holistically and applied permanently (Oluk, 2008).

#### **2.4 Research on Environmental Education in Early Childhood Education**

In this section, literature review related to “international and national studies regarding environmental education/education for sustainable development in early childhood education (ECE)”, “international and national studies regarding solid waste management and early childhood education”, and finally, “international and national studies regarding solid waste management and environmentally responsible behavior (ERB) and its predictors” are elucidated.

When the related literature on environmental education and early childhood education is examined, it is seen that despite the wide range of participants that

constitute the sample of the studies, the number of studies with preschool children are relatively low at both the international and national levels (Davis, 2009; Erdogan, Marcinkowski & Ok, 2009). Davis (2009) pointed out the lack of studies on early childhood education and environmental education with her preliminary literature survey including several Australian and international research journals on early childhood education and environmental education between the years 1996-2007. The analysis of this survey indicated that there was insufficient research: only 5% of the published articles throughout a 12-year period were related to early childhood education and environmental education. The majority of these articles examined the relationship between children and nature such as gardening projects (*education in the environment*). A few of them investigated the perception about environmental issues and topics (*education about environment*), and very few of them explored children's understandings and skills pertaining to sustainability issues such as energy usage, recycling and waste management etc (*education for environment*). Thus, it can be concluded that there is a need for further research on environmental education and early childhood education.

#### **2.4.1 International and national studies regarding environmental issues in early childhood education.**

Examination of the existing literature revealed that the majority of the studies on environmental issues in early childhood education focused on describing children's attitude, behavior and perception towards the environment by utilizing various data collection instruments such as questionnaires, interviews, observations. The following section summarizes the results of the international and the national studies, respectively.

##### ***2.4.1.1 Research on international studies on environmental education in early childhood education.***

An early research in the U.K. investigated 5-to-6-year-old children's attitude toward nature and environment via focus group interview (Bonnett and Williams, 1998). While collecting data, children were, first of all, asked to draw a picture of



their favorite place. Then, they were requested to list the things that worried them in their surroundings. Then, children sorted the things in their surroundings that required change and halt. Then they sorted the things that they believed were important; and, they would be disappointed unless the things changed and halted. These activities were used as warm-up activities before the interviews. Afterwards, interviews were conducted by utilizing photographs, which were ranged from more general thoughts related to nature to more specific environmental issues (e.g. litter on a beach). The results of both warm-up activities and interviews revealed that children's attitude toward nature and environment were generally very positive; however, it was observed that several dichotomies and ambivalence were related to the children's comprehension of and connection with nature and environment. For instance, in particular, even though they made connection between recycling paper and saving trees, they were not aware of other recycling materials except paper and their impacts on the environment. In addition, they could not make clear and definite explanations of the consequences of not doing recycling. According to the result of this study, children cannot establish a connection between their behavior and its consequences in terms of environment. Therefore, in the current research, the 3R implementation was constructed and implemented to increase the level of knowledge about the consequences of the 3Rs including making compost.

Musser and Diamond (1999) conducted another research to develop the scale called Children's Attitudes toward Environment Scale- Preschool Version (CATES-PV). This scale was administered to 42 preschool children (40 - 37 months) in the U.S.A. who were attending a preschool program including a non-structured pro-environmental curriculum but consisted only of activities about animals, plants and the environment. The main aim of this study was to determine whether the mentioned instrument was valid or not. In this research, while 23 of the participants were girls, the rest were boys. In addition, the participants' parents, totaling to 64 (34 mother and 30 fathers) completed the questionnaires related to environmental attitude and knowledge, and home environmental practices. The outcome demonstrated that this scale was valid; moreover, it showed that children's attitudes

toward the environment were generally positive and their attitudes were affected moderately by age but not gender. Additionally, it was found that there was a relationship between children's attitudes and their involvement in environmental activities. Therefore, their involvement with their parents in activities such as recycling organic gardening provided children with the opportunity to observe the process and to have direct experience with these activities. Moreover, even though parents' attitudes toward the environment were significantly correlated with their response pertaining to environmental practices, their attitudes were not correlated with their children's attitude. In addition, there was no significant correlation between the degree to which parents made explanation about environmental activities to their children or children's involvement in these activities and parents' environmental attitude and knowledge. The outcomes of this study can be interpreted that the more children and their parents actively participate in activities related to environmental education, the more knowledgeable about environment they become and have a positive attitude toward the environment. Hence, in the present research an implementation process related to the 3Rs including composting was conducted to provide children and their parents with active involvement.

Furthermore, a research was done by Paprotna (1999) to investigate 54 six-year-old Poland children's understanding of ecological concepts. These concepts included environmental protection, atmospheric pollution, waste, noise and nature reservation. The results of this study indicated that the easiest concepts for children to describe were noise and waste, whereas the most difficult one was nature reserve. This could be derived from children's everyday experiences, their immediate environment, as well as things and phenomena that were familiar to them. Moreover, children's understanding of the concepts was more significantly correlated with the period that they spent in pre-school training. Furthermore, children mostly described the concepts via storytelling and comparing them with known objects and phenomena. In addition, their understanding was significantly affected by their residential environment. In other words, children from a rural environment understood these concepts better since they had more chance to make contact with

nature than did urban children. However, their understanding was not influenced by their sex and parent educational level. The consequences of this study also highlighted the impact of the duration and the scope of the pre-school training regarding children's immediate environment and everyday experiences on children's comprehension related to environment. Thus, in the present study, an implementation process related to the 3Rs including composting was planned and carried out.

Additionally, Grodzinska- Jurczak, Stepska, Nieszporek and Bryda (2006) conducted a study on 674 six-year-old children from 30 preschools in Poland and 686 parents to investigate attitudes toward the environment and environmental problems and to define the environmental knowledge among children and their parents. The data were collected by using the same questionnaire called Children's Attitudes toward Environment Scale-Preschool Version (CATES-PV). The results of the study revealed that children knew the basic concepts and could describe inappropriate behavior toward the environment, whereas their knowledge and practical implementation related to environmental protection guidelines were unsatisfied. However, the majority of the children had positive environmental attitudes, especially regarding respecting animals and plants as well as keeping their immediate surroundings clean. On the other hand, the number of children who had a positive attitude toward waste segregation was low. The reason for this could be their considerably low level of knowledge and application in terms of waste management. Further, their attitudes were affected by their residential area. As regards parents, a majority of them stated that they often/very often separated their waste and threw them into the appropriate containers. In general, the analysis of the results indicated that occasionally parents also had positive environmental attitudes but they were not willing to change their habits for environmental protection, and their attitudes were affected by gender and educational level. The comparison of the outcomes indicated that the behaviors of children and those of adults were not connected with each other. What's more, Evans, Brauchle, Haq, Stecker, Wong and Shapiro (2007) examined 100 first- and second-grade children's ( $M=6.8$ ) environmental attitudes and behavior by utilizing a series of games, which were developed based on the New

Environmental Paradigm Scale. The participants, half of whom were girls and the rest were boys, came from public schools located in the rural areas in New York. According to the results of this study, there was no correlation between the attitudes and behaviors of young children. However, there was a positive and significant correlation between the attitudes and behaviors of their parents. Nevertheless, researchers considered that parents' attitudes and behaviors toward the environment may have an eventual effect on the development of children's attitudes and behavior toward the environment. In the light of the findings of these studies, in the current study, an implementation process related to the 3Rs including composting was constructed and performed, to enable children and their parents to be actively involved in the process and affect each other positively. Hence, the 3Rs including composting can become part of not only children's but also their parents' everyday life.

Besides, Chu, Lee, Ko, Shin, Lee, Min & Kang (2007) investigated 969 8-to-9-year-old Korean elementary school students' environmental literacy levels and the variables that affected their EL with the Environment Literacy Instrument for Korean Children (ELIKC). This instrument was developed by researchers and included four different dimensions (knowledge, attitude, behavior, and skills) comprised of 69 items and 13 demographic variables. The results of this study revealed that the correlation between attitude and behavior was the strongest, whereas the relationship between knowledge and behavior was the weakest. In addition, all variables of EL were influenced by gender, parent's educational level and the source from where students got information. On the other hand, students demonstrated negative responses about persuading parents to take action in certain situations. For example, they were not able to persuade their parents from buying fur coats. In addition, children displayed a lower rate of positive replies in terms of active participation in environmental issues. Based on the conclusion derived from this study, in the present research, the 3R implementation was planned and applied to promote change in children's eco-management and persuasion behaviors.

Additionally, two recent studies on education for sustainability were conducted. One of them was the two-year phenomenological study in Australia carried out by Lewis, Mansfield, and Baudains (2010) to describe the students' attitudes, understanding and behaviors related to the education for sustainability program they had attended. This program included three projects, namely biological survey, reed planting and turtle nest-watch that took place in the local context (i.e. the school grounds and nearby wetlands). The participants of this study were 15 pre-primaries and 21 lower primaries, totaling to 36 children. The data were collected via questionnaires, observation and collection of work samples. The findings of this study indicated that the education for sustainability program promoted young children's active and effective participation in learning experiences regarding sustainability. In addition, students could realize and state their development in terms of environmental knowledge, attitudes toward local environmental issues and behavioral intentions and actions to improve the environment. Furthermore, they increased their understanding about how natural ecosystems function healthily. Moreover, this program could provide for children with the opportunities to gain a deeper insight about the future and help them participate in real local environmental issues.

The other one was also a qualitative study including a two-phase approach (one year duration), namely Phase 1(case-study approach) and Phase 2 (participatory action research) and was conducted by Prince (2011). The participants of this study were twelve preschoolers, whose ages ranged from 3 to 5 years and who were attending two different schools in New Zealand, their parents and their teachers. The aims of this study were to examine the influence of a two-week integrated curriculum through a case study approach, and to examine the influence of a participatory action research on children, their parents and teachers through a project approach. The data were collected from children, their parents and teachers via various data collecting methods such as semi-structured interviews, focus group interviews, narrative observations and documents (i.e. field notes). The findings were examined in terms of children, parents and teachers. For example, children started to understand the

concept of the environment and sustainable living after participating in this research. In other words, a transformation occurred in their learning regarding the environment and sustainable living. Additionally, parents in two schools touched on specific points related to sustainable practice via paying attention to the natural environment. The comparison of the data collected from interviews held with parents between, before and after the research study indicated a change in their attitudes towards the environment and an awareness of sustainability issues (such as recycling). Moreover, the teachers stated that they learned new things (e.g. the blue whale is the biggest mammal in the world), did research on the topics that were of interest to them and children (such as sea creatures), and became much more aware of sustainability (e.g. over-fishing). According to these results, the study drew attention to the need for the integration of education for sustainability into early childhood curriculum. From the standpoint of these studies' results, the current study based on the 3R (including making compost) implementation process was conducted with the help of various activities (e.g. drawing, making compost...etc.) and methods (i.e. creative drama, storytelling...etc.) to support change in children's eco-management and persuasion behaviors as well as their parents' and teacher's behaviors and perceptions related to the 3Rs.

#### ***2.4.1.2 National studies on environmental education in early childhood education.***

In this part, national research on environmental education and early childhood education are explained in a chronological order.

To begin with, a study was carried out by Haktanır and Cabuk (2000) to examine 80 4-to6-year-old children's perceptions and ideas about environmental issues. The participants came from 12 private preschools. The researchers used a scale that they themselves had developed. It consisted of 18 environmental problem cases. In addition to perceptions and ideas, the effects of various background variables, such as gender, age and variables related to parents on children's perceptions about environmental issues were examined. The outcome of this study

showed that socio-economic status and the educational level of the mother had a significant effect on children's perceptions about environmental issues. In other words, children obtained higher scores from the scale when their families' socio-economic status and mothers' educational level increased. On the other hand, having a sibling had a negative impact on children's environmental perceptions. Furthermore, gender, age, family structure, mother's job, ages of parents, and the father's academic background had no significant effect on children's perceptions of environmental issues. Another study, conducted by Kesicioğlu and Alisinaoğlu (2009), with a sample of 353 preschool children of 60-72 months who were attending independent public preschools and kindergartens in public elementary schools, aimed to describe the natural environment experiences of the preschool children, which their parents provided them, and children's attitudes toward environmental issues. In this study, the 'Environmental Reaction Inventory', comprised of eight items, was used as a data collection instrument. The outcomes of this study revealed that children's attitudes were not significantly correlated with residence, their mother's educational level, their father's educational level, income, their mother's occupation and their father's occupation, but their attitudes were significantly correlated with gender. In the light of the findings of these studies, in the present study, an implementation process pertaining to the 3Rs including composting was designed and carried out to encourage children's and their parents' active involvement into the process. Thus, it is believed that both children and parents can develop positive behavior and attitude toward environment and environmental issues.

Recently, three qualitative studies have been carried out by various researchers in Turkey. One of them was conducted by Haktanır, Güler, Yılmaz, Şen, Kurtulmuş, Ergül, et al., (2011) to determine the preschool children's views about reduce and reuse. In this study, a short-term intervention based on the project approach was applied. The data were collected from 80 children via interviews. The findings revealed that before the intervention, children were able to understand the issues related to reducing and reusing. On the other hand, it was observed that

preschool children's ideas developed after the intervention. However, results of the study were not presented in detail.

Another study by Kahriman-Oztürk, Olgan and Tuncer (2012) aimed to investigate, by means of interviews, a total of 40 preschool age children's attitudes towards environmental issues (including consumption patterns, environmental protection, recycling-reusing and living habits), and the effect of gender on their attitudes. The interview protocol, including 15 questions and sub-questions, was adapted from 'The Children's Attitudes toward the Environment Scale-Preschool Version' (CATES-PV). The results of this study firstly revealed that the majority of 5-to-6-year-old children appeared to have eco-centric attitudes toward all environmental issues, but after an explanation regarding the reason for their attitude was requested, it was observed that they had anthropocentric attitudes towards environmental issues. In other words, even though preschoolers seemed to value nature for its own sake (eco-centric), they gave importance to the protection of the environment to sustain and promote their own lives (anthropocentric). In addition, gender had no significant effect on children's attitudes. A more recent study was conducted by Kahriman-Ozturk, Olgan & Guler (2012) with 36 preschool children to define their views on the three pillars (environmental, economic and socio-cultural) of EDS. The data were collected by means of "The Children's Attitudes toward the Environment Scale-Preschool Version' (CATES-PV)", which was adapted into Turkish by Kahriman-Ozturk, Olgan and Tuncer in 2012. This instrument was comprised of semi-structured interview questions. The collected data were analyzed through inductive content analysis method utilizing the 7Rs (reduce, reuse, respect, reflect, rethink, and redistribute). The findings revealed that children delivered an opinion about "reduce", "reuse", "respect", and "recycle"; whereas they did not make any explanations about their views pertaining to "reflect", "rethink", and "redistribute". In addition, there was no effect of gender on children's views about sustainability. Based on the conclusion of these studies, in the current study, the 3R implementation was planned and implemented to support the development of



children's eco-management and persuasion behaviors regarding the 3Rs including composting.

In conclusion, the analysis of both national and international studies indicated that children had generally positive attitudes toward the environment, but they had anthropocentric attitudes towards environmental issues. Although some research found a strong relationship between attitude and behavior, some of them did not find any relationship between them. In addition, distinct results were reached in terms of the effect of background variables (such as gender, age, father educational level... etc.) on their attitude, behavior and perception towards the environment. Moreover, in recent years, international and national studies including an intervention process related to sustainability have increased; however, they are still insufficient. Furthermore, researchers accentuated the effects of children's training in environment, environmental issues and sustainability on their behavior and attitude towards the environment. Hence, in the current research, an implementation process related to the 3Rs was constructed and carried out to encourage children's and their parents' active participation. Thus, children can improve eco-management and persuasion behaviors pertaining to the 3Rs. Further, their parents and teacher can develop a positive behavior and attitude toward environment and environmental issues. In the following part, international and national studies on solid waste management are examined in accordance with the purpose of the present study.

#### **2.4.2 International and national studies regarding solid waste management.**

The investigation of relevant literature demonstrated that international and national studies related with solid waste/solid waste management were conducted to define preschool children's knowledge and perceptions about these concepts. However, research related to an application about solid waste/solid waste management was rarely observed. Therefore, it was difficult to describe the effects of the implementation related with solid waste/solid waste management on environmentally responsible behavior (ERB) and its various predictors. Because of

this, in this part, first of all, international and national studies that were carried out on preschool children are introduced; subsequently, the studies related to environmentally responsible behavior and its precursors performed with participants older than preschoolers are presented.

#### ***2.4.2.1 Research on international and national studies on solid waste management in early childhood education.***

The existing literature revealed that there is a series of studies about the “Emergent Environmentalism” project carried out by Palmer and his colleagues, 40 researchers in 16 countries and six continents. The main aim of the international, national and longitudinal project was to explore how environmental awareness, knowledge and concern occurred in the minds of individuals (both adult and children) and whether or not pro-environmental behavior was motivated by critical understanding and concern. The first study was conducted by Palmer (1999) to identify the quality and effect of environmental education and the lack of effect of formal education on some issues, such as environmental awareness and concern. To this end, data were collected from both children (4-to-6 year old) and adults using semi-structured interviews and autobiographical techniques. To examine the children’s knowledge and views about particular issues, data were collected from 527 children in three counties, namely England, Slovenia and Greece. During the interviews, seven photographs and key questions were used to describe the children’s understanding of places and issues, namely tropical rain forest (containing deforestation and endangered species) polar environments (containing the effect of global warming on the poles), the management of waste materials, their awareness regarding environmental issues and their perceptions about the effect of short-term and long-term changes on the environment. The findings revealed that four-year-old children’s number of misunderstandings regarding rainforest inhabitants was least in Greece when compared with those in the other three countries. However, these misunderstandings did not appear in the 6-year-olds. While in the U.K., 4-year-old children were inclined to focus on short-term impacts, Slovene and Greek children at the same age could understand long-term impacts. However, six-year-olds in all

countries mentioned fewer short-term impacts in their responses, while mentioning more long-term effects. When the answers of the children about management of waste materials were examined, it was seen that U.K. and Slovene children possessed a better perception regarding the initial collection of waste and dumping and its tipping process than Greek children. The great majority of 4-year-olds could understand that household rubbish should and can be managed. In addition, 6-year-olds could display complex thinking about some contents. For instance, they were able to explain that only some of the waste could be recycled. They could distinguish recyclables and non-recyclables and explain that different processes were required for both recyclables and non-recyclables. However, the results drew attention to gaps in knowledge and common pre/misconceptions. For example, all waste was disposed of and could not be reused again, or materials (cans, packet etc.) could be cleaned and filled up again. To remove these pre/misconceptions, a planned and progressive educational method should be used. The implementation in Greece was presented as an example for that advice. First of all, the results of the emergent environmentalism project were shared with the teachers and then the teachers were informed about global warming. Afterwards, the results of the project were reviewed and a three-week program was designed by teachers and experts. In this program, the drama approach was used with some techniques such as role-play and teacher in role to deal with the lack of knowledge and understanding about global warming of 4 and 6 year-old children. In addition, simple experiments, outdoor education, hands-on activities, such as creating earth models, and storytelling took place in this implementation. At the end of this study, the researcher reached five key findings: a) individual experiences related to the natural world are critical in terms of their short- and long-term effects, b) early childhood years is a crucial period, during which the motives of consideration and feelings about the environment emerge and continue in their future life, c) young individuals (including the very young) can think in a more complex way about environmental issues than many people (such as educators and researchers) may do so, d) common misconceptions about environmental issues and distant places emerge in children's minds even if they receive training and other

educational experience, e) formal education does not (and probably cannot) have a real effect on the support of people's innermost feelings about the environment.

Another study related to the "Emergent Environmentalism" was performed by Palmer (1995). It was a major international project in which numerous researchers from twelve countries (later increased to sixteen countries) were involved. The aim of this project was to examine how young children and adults obtained and developed their environmental knowledge, awareness and concern. In this study, 186 children, who were children of 4-to-6 years of age from the U.S.A. and the U.K., participated. The findings of this study were similar to the former study (Palmer, 1999). However, this paper focused solely on waste management. The results indicated that 49% of 4-year-olds could comprehend that "waste products are managed", which means they are collected in an organized way. In addition, 23% of 4-year-old children had heard the concept of recycling and had a perception about "what it means". On the other hand, only 6% of them could state that "while some materials can be recycled, the others cannot" and only 2% of them could perceive the concept of conservation or waste reduction. All 6-year-olds could say that "waste should not be left lying around" and 97% of them made explanations about waste collection organization. However, very few of them explained "why materials are recycled". There was a common misunderstanding that everything was recycled and how waste products were recycled. In addition, they thought that all recycled things were used for the same purpose, for which it was originally aimed. Only a few of them could explain the actual recycling process. The rest of them found creative solutions for the use of waste, such as in making robots, hats etc. Furthermore, the examination of children's knowledge source showed that for 4-year-olds, it was their family and for 6-year-olds, it was school and television. The most interesting outcome of this study was the lack of personal involvement of children in the recycling process in the U.K. since they considered recycling as the mission of "the bin man" and "the recycling people". All these consequences revealed that a wide range of classroom activities should be designed to increase children's level of conceptual understanding about waste management and reduce the lack of knowledge and misconceptions. Also,

incorrect knowledge may arise when contents and classroom tasks are planned, and thus, teachers should be educated on this issue.

The other international and longitudinal study pertaining to the same project was conducted by Palmer, Grodzinska- Jurczak, and Suggate (2003). In this study, data were collected from 137 four-year-olds (65 girls and 72 boys) and 138 six-year olds, (63 girls, and 75 boys) from England and 95 four-year-olds (43 girls and 52 boys) and 93 six-year-olds (47 girls and 46 boys) from Poland by means of interviews. While the U.K. children were interviewed between the years 1994 and 2000, Polish children were interviewed in 2000 and 2001. The aims of this study were to identify children's knowledge and understanding regarding waste and waste management, the gaps in their knowledge, their pre-conceptions, their inaccurate knowledge as well as biased, stereotypical thinking, and the origins of their knowledge. It also aimed to compare their awareness of waste. The results of this study were comprised of three parts, namely, the analysis of the responses given to the interview questions by U.K. children, those provided by Polish children and the comparison of the two sets of responses. The analyses of the interview responses showed consistency with the findings of Palmer (1995)'s study. Nearly all 4-year-olds in both countries explained that waste materials should not be thrown on the ground and could explain why this is so logical. The main difference occurred among 6-year-olds. For example, while over 80% of the Polish children stated that rubbish was buried, most of the U.K. children only stated that it went away in the bin, went to the tip or dump. A few Polish and the U.K. 6-year-olds considered it was impossible that rubbish could be used again. While the Polish children considered that it was possible for an object to be used a second time without changing its previous form, the U.K. children were aware that the form of the object might be changed in a machine or factory. In addition, the UK children used the word 'recycle' although they did not always know what this meant exactly. As a result, there was an obvious distinction between the two countries. This situation could be derived from differences in national waste management systems, awareness of environmental issues and media coverage of waste as a topic of importance and school curricula,

educational materials and teacher preparedness to teach about waste management. Generally, all outcomes indicated that young children could understand complex issues such as waste and waste management, and thus, they could be more aware and concerned about this issue when they attended carefully-structured and holistic educational programs. In addition, teachers had an important role in applying these educational programs, and thus, teacher education on these subjects was also significant.

In summary, the above-mentioned studies draw attention to the fact that young children can understand short-term and long-term effects of solid waste/solid waste management, whereas they had misconceptions and lack of enough knowledge. Even though this outcome indicated that there was a need for an educational program/implementation including solid waste/solid waste management in school curricula, insufficient research existed in the existing literature. For instance, an action research with children of 4-to-5 years of age (n=20) was carried out by Apanometritaki (1995) to increase their knowledge about waste management and recycling after a 7-month course. In this study, a structured interview protocol comprised of four questions (what is recycling, what is paper made of, can paper be reused, what do we do with our trash) was developed to assess children's knowledge. In this educational program, in-class recycling bins, visits to parks and neighborhoods to observe litter, in-class discussions on litter and recycling, role-playing and a visit to a recycling plant were organized. After the course was completed, the post-intervention interviews' findings revealed that nearly all of the children understood basic concepts of waste management and recycling.

Furthermore, a study was performed by Lee and Ma (2006) to investigate the effects of different school-based programs on children's attitudes and behaviors. In this study, first of all, teachers from four kindergartens participated in four workshops lasting three-four hours. Then, they developed their own school-based programs, the themes of which were animals, plants, and food and green angels. After the programs were completed, the researchers collected data from the teachers and parents by means of questionnaires and interviews to obtain feedback and ideas

about the program and changes in children's attitudes and behaviors. The outcomes demonstrated the children's attitudes and behaviors were developed in general. However, there was a conflict between the responses of the parents and those of the teachers in the two schools. Apart from this, children did recycling and reused materials, especially during their project. In this study, parent involvement activities took place, but they did not want to or were too busy to participate in projects. The researchers drew attention to the lack of appropriate educational materials for kindergarten children and mentioned that the major difficulty of this study was inappropriate recycle bins for children to collect waste regularly, which lead to hygiene problems. They highlighted the importance of cooperation between the family members and school staff.

In addition, a similar study in Turkey, "An Applied Environmental Education Project", was carried out in elementary schools and preschools in 2000-2001 with the support of local governments related with the environment and education, a non-governmental organization and Uludag University. In this project, environmental education was supported with music and drama activities. Also, activities related to recycling (such as a field trip to the recycling center, making paper from waste paper, constructing new things by using waste materials) were carried out (Sungurtekin, 2001). However, the results of the study were not presented in the article.

In conclusion, relevant studies about solid waste/solid waste management highlighted that the number of research studies on environmental education in early childhood education should be increased owing to the significant effect of environmental education on preschoolers' environmental knowledge, perception and attitude. Yet, the analysis of the above-mentioned studies indicated that the effects of variables on environmentally responsible behaviors related with solid waste management in early years were not touched on sufficiently. Therefore, in the following part, research investigating the effects of variables including "environmental attitude", "personal responsibility", "personal investment", "intention to act", "environmental knowledge" and "situational factors" on

environmentally responsible behaviors pertaining to solid waste management conducted with participants older than preschoolers are presented respectively.

#### ***2.4.2.2 Research on international and national studies related to solid waste management and environmentally responsible behavior as well as its predictors.***

According to the Hines Model of Responsible Environmental Behavior and analysis of research revealed that environmentally responsible behavior was predicted by main variables, namely personality variables, cognitive variables, and situational variables (Hines et.al.1986/87). When the related literature related to former meta-analysis studies (Hines, et al., 1886/87; Hornik, et al., 1995; Osbaldiston, 2004), research studies (Hsu, 1997; Marcinkowski, 1998; Mony, 2002), and theoretical models (Hines, et al., 1886/87; Hungerford & Volk, 1990) are investigated, it is perceived that environmentally responsible behavior is predicted by four categories as suggested by Erdogan (2009). These are personality factors (environmental concern, environmental sensitivity, locus of control, environmental attitude, environmental responsibility and intention to act...etc.), cognitive factors (knowledge and skills), demographic factors (age, gender, residence, education level of parents...etc), and external factors (external influences, social pressures, opportunities to choose different actions...etc.). However, the current study only focused on personality factors (environmental attitude, locus of control, environmental responsibility, intention to act, and personal investment), cognitive factors (environmental knowledge) and external factors (situational variables). These factors and related variables, as well as studies regarding these variables, are explained in the following part.

#### ***Personality Factors***

Environmental attitude, locus of control, environmental responsibility, intention to act, and personal investment are categorized under personality factors as described by Erdogan (2009) because all these variables are related with personal



structure, which affects the desire to act. Further, environmental attitude, locus of control, environmental responsibility are already defined as personality factors in the Hines Model of Responsible Environmental Behavior by Hines, et al., (1986/87). The last two predictors are placed among the empowerment variables in the Environmental Behavior Model and these variables are fundamental factors that give individuals a feeling that they can change and help to solve crucial environmental issues (Hungerford & Volk, 1990). These variables and related studies are explicated respectively in the subsequent part.

*Environmental attitude* is a psychological construct and defined as a set of beliefs dealing with the individuals' favorable or unfavorable feelings, in terms of particular aspects of the environment (Hines et al., 1986/87; Newhouse, 1990). There are two types of attitudes in relation to the environment a) attitudes toward ecology and environment as a whole; and b) attitudes toward taking environmental action (Hines et al., 1986/87).

When research pertaining to “environmental attitude” and environmentally responsible behavior was examined, it was observed there was a positive relationship between them. For instance, Hornik et al. (1995) meta-analyzed 67 empirical studies examining the variables that impacted consumer recycling. They proposed four groups of variables, namely intrinsic incentives, extrinsic incentives, internal facilitator and external facilitator. The outcome of the study indicated that the strongest precursors of recycling were internal factors, specifically, consumer knowledge and commitment to recycling. Also, in this study, results demonstrated a high correlation between LOC and recycling behavior. In addition, Chan's (1996) study with 992 secondary students from Hong Kong revealed that there was a significant, positive and high correlation among environmental attitudes and the different types of behavioral intentions (a major precursor of environmentally responsible behavior) containing paper recycling at school and at home and using of fewer tissues and plastic bags.

*Locus of control (LOC)* is defined as “individuals’ *perception of whether or not he/she has the ability to bring about change through his/her own behavior*” (Peyton & Miller, 1980, p. 174). In the present study, LOC is described as an individuals’ perception of his/her ability to impact on the solution and prevention of environmental problems. This predictor is categorized as internal and external locus of control (Peyton & Miller, 1980). While a person with an internal locus of control believes that his/her own action can bring about change, a person with an external locus of control feels that his/her action is unimportant, and change can only be brought about by powerful others.

The analysis of the studies regarding LOC revealed that this variable was one of the precursors of environmentally responsible behavior for the Hines Model and Environmental Behavior Model (Hines et al., 1986/87; Hungerford & Volk, 1990) proven with a meta-analysis study by Hines et al., (1986/87). In this study, 15 empirical studies regarding the relationship between LOC and environmentally responsible behavior were investigated and found that LOC was one of the predictors of environmentally responsible behavior. This outcome was also supported by other studies. One of them was a meta-analysis by Cherian et al. The results of this study demonstrated a high correlation between LOC and recycling behavior. In addition, Hsu and Roth (1998, 1999) found a significant relationship between LOC and environmentally responsible behavior. Furthermore, based on their model, Hwang, Kim and Jeng (2000) described that the relationship between LOC and intention to act was significant and proposed that environmental education should focus on supporting the internal locus of control to improve environmentally responsible behavior.

*Personal responsibility* is defined as personal obligation or a sense of duty to implement actions (Boerschig & DeYoung, 1993). Moreover, it is described as individuals’ feelings of duty or obligation and is categorized under personality factors that affect one’s desire in the Hines Model of Responsible Environmental Behavior (Hines et al., 1986/87). They state that *environmental responsibility*

includes the sense of obligation toward the environment as a whole or only solutions of environmental problems.

The analysis of the correlation between “personal responsibility” and environmentally responsible behavior revealed that there was a positive correlation between them. For example, in their meta-analysis of six studies, Hines et al. (1986/87) found that personal responsibility was one of the major precursors of environmentally responsible behavior. Furthermore, to examine the precursors of pro-environmental behaviors (recycling, public transportation, water and energy conservation, and safe product purchasing) a multinational study with college students from five different countries was conducted by Schultz and Zelezny (1998). The outcomes of the study indicated that pro-environmental behavior was significantly correlated with responsibility for the Mexican, Spanish and the U.S.A. samples.

*Personal investment*, which is a crucial factor in the ownership variables category, may share a synergistic relationship with the intention to act, and it is explained that an individual identifies him/herself strongly with the issue since s/he has a personal interest in it. This interest can be derived from environmental consequences and/or economic consequences (Hungerford & Volk, 1990). Moreover, Monroe (2003) claims that this predictor may increase the possibility of the sense of obligation (personal norm) influencing the desire to act.

The analysis of the relationship between “personal investment/perceived consequences of recycling” and environmentally responsible behavior/intention to act revealed that there was a significant correlation between them (Chen & Tung, 2010; Davies, Foxall & Pallister, 2002; Hopper & Nielsen, 1991; Hungerford & Volk, 1990; Tonglet, Phillips & Read, 2004). For instance, according to Chen and Tung (2010), as long as individuals have a better perception of the consequences of recycling, they will be more eager to do waste recycling.

*Intention (intention to act)* has been viewed “as the conative component of attitude and it has usually been assumed that this conative component is related to attitude’s affective component” (Fishbein & Ajzen, 1975, p.289). Intention to act is one of the important variables taking place in the model of Hines et al., (1986/87). It also takes part as one of the empowerment variables in the Environmental Behavior Model, which are significant for the training of responsible citizens in environmental education (Hungerford & Volk, 1990). Additionally, they assert that this precursor is closely linked with both perceived skill in taking action and locus of control.

When studies describing the correlation between “intention to act” and environmentally responsible behavior were examined, it was perceived that there was a positive correlation between them. For example, Hines et al. (1986/87) revealed that intention to act was the strongest predictor of environmentally responsible behavior according to the findings of the meta-analysis of six studies. They also pointed out that the effect of the intention to act on behavior did not appear without the combination of the other variables, such as cognitive knowledge, skills and personality factors. Furthermore, Cheung, Chan and Wond (1999) investigated waste-paper recycling behaviors of 282 college students in Hong Kong. The outcomes demonstrated that the subsequent waste-paper recycling behavior was significantly predicted by behavioral intention based on the theory of planned behavior. Also, behavioral intention was predicted by perceived difficulty and this connection affected the link between intention and behavior. In addition, Harland, Staats and Wilke (1999)’s study with 445 Dutch people aimed to explore the relationship between the intention of past and that of pro-environmental actions. The result of this study indicated that there was a significant and high correlation between intention and participants’ use of unbleached paper and use of other transportation than the car and turning off faucet while brushing teeth. Also, Klöckner and Oppedal (2011)’s study aimed to determine the predictors of general and fraction-specific self-reported recycling behavior (paper/cardboard, glass, metal and plastic) based on their proposed model. The results of this study revealed that general recycling behavior was predicted well by intentions to recycle, but perceived behavior control

(LOC) had a low effect on behavior. On the other hand, intra- individuals' distinctions were predicted largely by the distinct fraction-specific intentions and specific perceived behavior control (LOC) jointly with recycling system specific characteristic, such as convenience of drop-off point system.

### Cognitive Factors

In the present study, “environmental knowledge” is placed among cognitive factors since this predictor is connected with cognitive features.

*Environmental knowledge* also includes both individual's knowledge on ecological behavior and factual knowledge (e.g. knowledge on ecological concepts, knowledge of environmental problems and issues and knowledge of action strategies) (Hines et al., 1986/87). Furthermore, environmental knowledge is divided into three parts in the Environmental Behavior Model, namely knowledge of ecology, in-depth knowledge and knowledge of environmental action strategies, and each type of knowledge takes place under three different variable categories, respectively: entry-level variables, ownership variables and empowerment variables (Hungerford & Volk, 1990). For both models, it is claimed that environmental knowledge emerges to be a prerequisite to action.

The examination of the studies about the relationship between “environmental knowledge” (including solid waste/solid waste management, such as recycling knowledge) and environmentally responsible behavior related with waste management (including recycling, reusing, reducing and making compost) revealed that there were distinct results that explained this relationship. For instance, Hornik, et al., (1995) found that knowledge of recycling was observed to be the strongest predictor of recycling behavior. Also, Prestin and Pearce (2010)'s study with junior high school and high school students pointed out that the lack of knowledge about the distinction between recyclables and non-recyclables was a major obstacle to recycling behavior. On the other hand, a study by Alp, Ertepinar, Tekkaya and Yılmaz (2008) was conducted with 1,140 elementary school students in Ankara to examine their environmental knowledge regarding recycling, water and energy usage, environmental pollution and attitudes. They also examined the influence of

socio-demographic variables (grade level, gender and parental educational level) on environmental knowledge, attitudes on self-reported environmentally friendly behaviors, and the effects of behavioral intention, environmental affects, and internal locus of control (LOC) on self-reported environmentally friendly behaviors. The consequences of this research presented that students' knowledge about environmental issues was insufficient but they had more positive attitudes toward the environment. Also, behavioral intention, environmental affects and LOC were significant precursors of self-reported environmentally friendly behaviors; however, behaviors were not predicted by environmental knowledge.

#### External Factor

Situational factor is constructed under external factors as described by Kollymuss and Agyeman (2002) since this variable is not derived from internal (personal) conditions.

*Situational factor*, further, includes economic constraints, social pressure, opportunities and barriers that counteract or strengthen the environmentally responsible behavior and its precursors (Hines et al., 1986/87; Kollymuss & Agyeman, 2002). Moreover, this variable takes part as one of the variables that has a direct effect on REB in the Hines Model (Hines et al., 1986/87).

The analysis of the correlation between “situational factors” and environmentally responsible behavior indicated that opportunities/facilities affected environmentally responsible behavior positively. For example, a study was carried out with academic staff and secretaries and administrative assistants in academic departments by Amutenya, Shackleton and Whittington-Jones (2009) to investigate the effect of the availability of recycle bins and the policy of the university related to waste management on recycling rate. The result of this study revealed that the university policy and increase in the number of recycle bins increased the recycling rate. Furthermore, in a study by Martin, Williams and Clark (2006), whether or not the householders' attitudes to recycling was related with poor recycling performance and other social, cultural and structural factors was investigated. The outcomes of

this study indicated that the householders were very eager to take part in recycling; however, they complained that local recycling services were highly unreliable and inconvenient and that there was lack of space, and thus, researchers inferred that the reason for the poor recycling rate was situational factors. In addition, 80% of the householders recycled paper because of lack of local recycling services. Moreover, a cross-national study in 15 European countries was conducted by Guerin, Crete and Mercier (2001) to investigate the effects of national settings, social and institutional factors and a series of individual characteristics on recycling behavior. The outcomes at personal level indicated that people who had global environmental concern and joined a local program concerned with environmental protection considered that their governments attempted to protect the environment and took reasonable precautions. These people were inclined to demonstrate environmentally responsible behavior such as recycling. On the other hand, at the country level, the incidence of recycling behavior increased when the number of people participating in recycling programs and/or were members of environmental organizations also increased. Another study with 191 participants in a local kerbside recycling system was conducted by Tonglet, Phillips and Read (2004) to explore the predictors of recycling behavior based on the theory of planned behavior. The results indicated that recycling behavior was predicted mostly by pro-recycling attitudes and these attitudes were affected primarily by having appropriate opportunities, facilities and knowledge to recycle and secondarily, by not being obstructed by physically recycling (such as time, space and inconvenience). Also, the consequences of recycling were significant precursors of recycling behavior. In addition, a research study about the effect of situational factors on environmentally responsible behavior in Turkey was conducted by Erten (2003) with 5<sup>th</sup> grade students. The study observed whether the students' environmentally responsible behavior showed differences depending on whether or not the school they attended was an Eco-school. In the study, he implemented lesson plans in which a whole week was devoted to the topic of garbage reduction to identify students' knowledge, attitude and behavior about garbage reduction and whether there was a relationship among these variables. After the implementation, while collecting data, he realized that half of the participants asked questions about

why municipalities took garbage and waste separately and added that they disliked this situation, because even if they themselves separated garbage and waste, these materials were taken together, and thus, their efforts were meaningless.

In conclusion, it was found that there were various variables from environmental knowledge to situational factors that affected environmentally responsible behavior related with solid waste management. Thus, environmental educational programs that aim to change individuals' behavior should be designed by giving importance to these variables. This was also supported with Erten's (2003) study. In his study, Erten observed that students' environmental consciousness, their attitudes and interests related with environmental protection increased and converted to behavior after the implementation.

Even though in recent years, environmental education has been given more importance and it has been stated that it should start from early childhood years, there is a wide gap at not only the national but also the international level in this field especially in terms of educational programs and projects in early childhood education. In this respect, the present study aims to shed light on how effective environmental education program can be designed and carried out by adapting it to an ongoing curriculum in the kindergarten. It also aims to investigate the impact of a six-week implementation pertaining to the 3Rs as well as composting, including various activities ranging from field trips, storytelling, parent involvement in creative drama, on children's eco-management and persuasion behaviors related to the 3Rs and composting, as a part of environmentally responsible behavior and its predictors since according to Zelezny (1999), interventions in classroom setting are more effective than interventions in nontraditional settings while improving individuals' environmental behavior.



## **CHAPTER III**

### **METHOD**

In this chapter, the method of the study is presented. The chapter begins with the description of the overall design of the study, followed by information on the participants and setting of the study, data collection instruments, data collection and finally data analysis procedures.

#### **3.1 General Design and Rationale of the Study**

The main purpose of the present study was to investigate the influence of a six-week implementation pertaining to the 3R implementation on change in 60-72 month-old kindergarten children's eco-management and persuasion behaviors as a part of environmentally responsible behavior (ERB) related to the 3Rs within the home and school environments. Furthermore, how kindergarten children's predictors of behaviors related with the 3Rs were promoted with activities throughout the implementation was examined. Moreover, the impact of the implementation on the children's parents' and the teacher's views and reflections were determined.

Based on the purposes, the current study was designed with respect to the criteria of evaluating the application of qualitative methods to intervention research (Nastasi & Schensul, 2005). The present research was comprised of three stages, namely pre-implementation, implementation and post-implementation stages, and qualitative data collection procedures were adopted.

As can be observed in Figure 3.1, the current research started with the review of the related literature and the national early childhood curriculum (2006 MONE). Based on the review, a conceptual framework of the research and its design was constructed. With respect to the design of the study, participants of the study were selected and the six-week implementation procedure was created.

Then, the data collection tools and the interview protocols were developed to determine the influence of the implementation. After the design of the implementation and the development of the interview protocols, experts examined both the implementation and the interview protocols in terms of various criteria such as comprehensibility, appropriateness of kindergarten children's developmental properties...etc. After the examination of the experts, the regulations regarding the implementation procedure and data collection tools were devised, and then, the pilot study was conducted and the necessary contacts were made. Subsequent to the pilot study, in pre-implementation stage, pre-data were collected. Then, the implementation procedure was carried out. Then followed the post-implementation stage, during which post-data were collected. Lastly, the pre-and post-data were analyzed to investigate the influence of the implementation. The steps of the overall design of the present study are summarized in Figure 3.1.

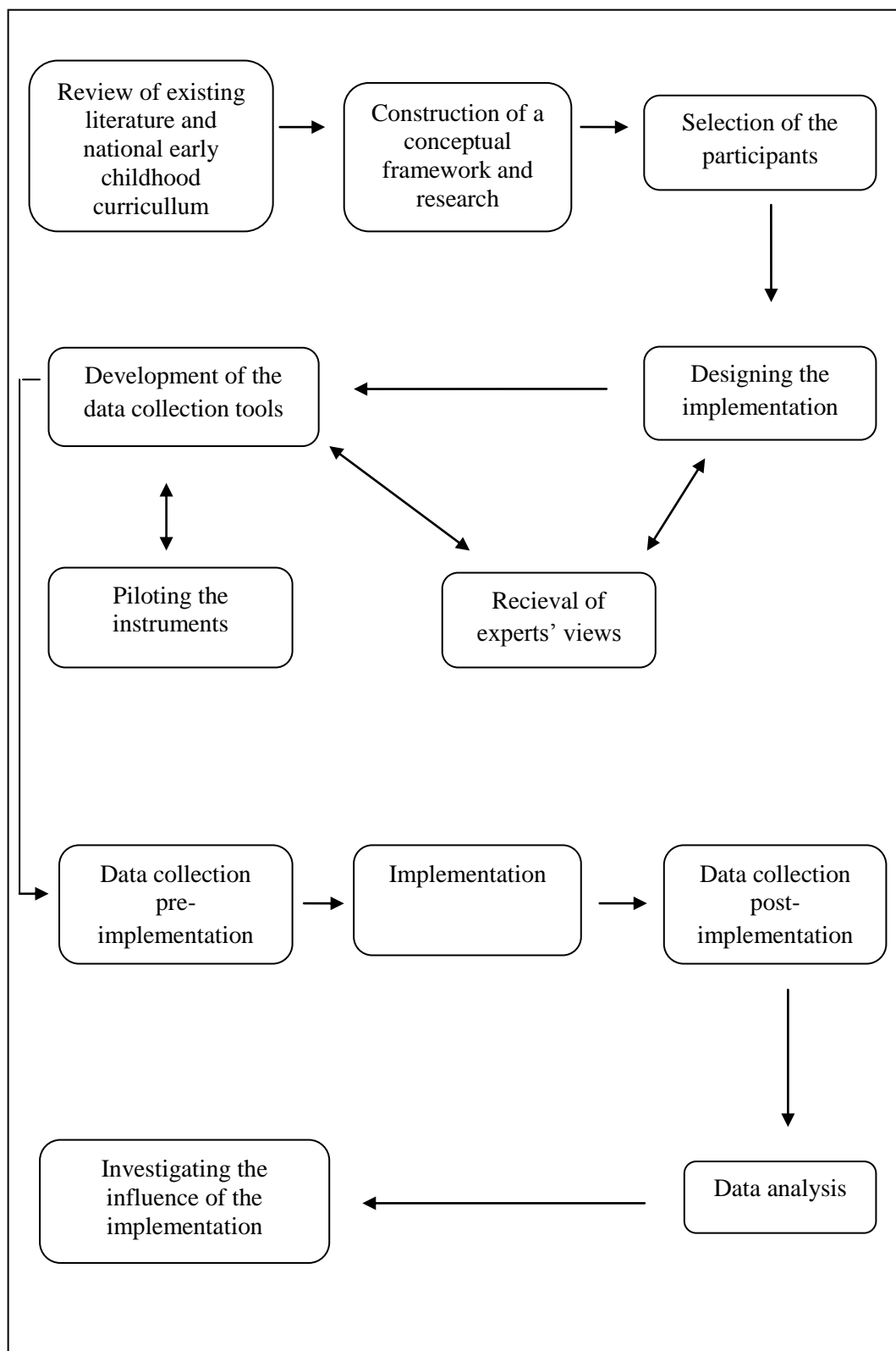


Figure 3.1 The Summary of the Overall Research Design

### **3.2 Participants**

The selection of the participants in this study was based on convenience sampling, which is one of the types of purposeful sampling (Merriam, 2009). This sampling method is chosen according to location, availability of sites and respondents (children, their parents and teacher) and children's experiences in eco-school.

The participants of the study were 24 kindergarten children, 23 parents and their teacher. All children (12 girls and 12 boys) were 60-72 months old and they were attending kindergarten at the public elementary eco-school in the Çankaya district of Ankara. Further, all of them had already attended approximately one year of kindergarten at this school. More than half of the children had nuclear families (n=15, %=62.5) and the rest had extended families (n=9, %=37.5). Their parents' educational level ranged between middle school to university. A minority of parents had graduated from middle school (n=3, %=12.5) and high school (n=7, %=29.1), while the remaining majority had graduated from graduate school (n=2, %=8.3) and university (n=12, %=50). Furthermore, seven of the children (29.1%) had no siblings, whereas two-thirds of the children (n=16, %=66.6) had siblings. Thirteen of them (54.1%) had a sibling; two of them (8.3%) had two siblings and two of the children (8.3%) were twins (Table 3.1).

Table 3.1

*General Characteristics of the Participants*

	Frequency (%)	
Gender		
Girl	12	50
Boy	12	50
Family Type		
Nuclear Family	15	62.5
Extended	9	37.5
Educational Level of the Parent		
Middle school	3	12.5
High school	7	29.2
Graduate school	2	8.3
University	12	50
Number of Siblings		
0	7	29.1
1	13	54.1
2	2	8.3
> 2	2	8.3

A total of 23 parents (20 mothers, 2 fathers and 1 grandmother) participated in this study. The parents' age ranged between 25 and 60, the average being 36 years of age. Their level of income ranged between 500 and 7,000 TL with an average of approximately 3,000 TL. Except for five families, only one of the parents was employed, in all the other families both the mother and the father dealt with various professions from artisanship to teaching.

The teacher, who was 44 years old, also took part in the study. She held a university degree from the department of child development and she had a 20-year teaching experience and had been working at the school where the implementation was conducted for 12 years.

### **3.3 Setting of the Study**

This study was conducted during the spring semester of the 2011-2012 academic year at the public elementary school's kindergarten certified as an eco-school located in the Çankaya district in Ankara. In this part, detailed information

about the Eco-school program implemented in the school, and then, about the physical properties of the school is presented.

At this school, school and community action, which is a part of the Eco-School program, has been applied since 2003. The program, based on democratic and participatory approach, promotes children and youth's active participation in how their schools can be directed for the benefit of the environment, and it emphasizes the significance of civic values, which have been held in Turkey since 1995 by the Turkish Environmental Education Foundation (TÜRÇEV). According to TÜRÇEV, in order to implement the program of Eco-Schools successfully, the support of the school manager and the executives, the children's desire to participate in the decision-making process and the activities pertaining to program of Eco-Schools program, and the demand to take action to encourage the long-lasting, and effective change are crucial. To fulfill these requirements of TÜRÇEV, in the school where the implementation was performed, an Eco-School Committee, which was comprised of the school manager, the assistant manager, coordinator teachers, member teacher, the head of school council and families, and an Eco-Team, which consisted of one voluntary student from each class from 4<sup>th</sup> to 8<sup>th</sup> grades, was established. Furthermore, by the time of implementation, this school had won four green flags. Moreover, during the 2011-2012 academic year, at the end of the spring semester, the school ranked third in Turkey in the competition called Environment and Innovation Project 2<sup>nd</sup> Cycle, organized by TÜRÇEV with the support of Toyota Motor Europe. In this competition, the school won the prize with their project, which aimed "to reduce, reuse and recycle garbage". Also, an exhibition independent of the competition related with recycling, reducing and reusing was organized with the participation of the whole school (K-8) including kindergarten children, who prepared a fashion show in the fall semester of the 2011-2012 academic year.

Apart from this, when the physical properties of the school where implementation was conducted were examined, it was seen that this school was surrounded by a large garden comprised of a main garden including the front, back and two side-gardens, and an area that was separated from the main garden with iron

fences. In the area which was independent from the main garden, there were plants, especially trees, but few flowers. However, generally, this area was locked and students were not allowed to go there because it was linked with the kindergarten children's playground that was also surrounded and separated from the main garden with iron fences. The main garden was surrounded by iron fences and there were benches, dustbins and two recycling bins belonging to the Environmental Protection and Packaging Waste Recycling Recovery and Recycling Trust (ÇEVKO), but there were no plants such as trees and flowers, and the front garden's ground was covered with asphalt since it bore designs of some games, such as hopscotch, because of project named "Let's go out and play" (Çık dışarıya oynayalım in Turkish).

### **3.4 Data Collection Instruments**

In the present study, data were collected by means of interviews from various sources, namely children, parents and the teacher. To increase the internal validity (credibility) of the findings of the current study, multiple data sources, which is one of triangulation strategies as proposed by Denzin (1978), was used. The data collection instruments for each distinct source are summarized in Table 3.2 below.

Table 3.2

*Summary of the Data Collection Instruments*

Timeline	Data Source	Instrument	Aim
Pre-Implementation	Children	Pre-Interview	<ul style="list-style-type: none"> <li>✓ to ascertain the level of kindergarten children's eco-management and persuasion behaviors related with the 3Rs including making compost</li> <li>✓ to discover the predictors that influence the children's eco-management and persuasion behaviors</li> </ul>
			<ul style="list-style-type: none"> <li>✓ to examine possible impacts of the 3R implementation on eco-management and persuasion behaviors related with the 3Rs including making compost</li> <li>✓ to investigate their behaviors' precursors (such as environmental knowledge, situational factors, environmental attitude)</li> </ul>
Post-Implementation	Parents	Post-Interview	<ul style="list-style-type: none"> <li>✓ to verify the findings of children's interviews</li> <li>✓ to utilize parents' observations of the alteration in their children's eco-management and persuasion behaviors as well as their behaviors' precursors at home after the 3R implementation</li> <li>✓ to define the influence of the 3R implementation on the parents' views and its reflections on their home environment</li> </ul>
	Teacher	Post-Interview	<ul style="list-style-type: none"> <li>✓ to verify the findings of children's interviews</li> <li>✓ to utilize teacher's observations of the alteration in children's eco-management and persuasion behaviors as well as their behaviors' precursors at school after the 3R implementation</li> <li>✓ to describe the influence of the 3R implementation on the teacher's views and its reflections on her home environment</li> <li>✓ to get information about the project(s)/ activity(ies) related with recycling at school throughout the 2011-2012 academic year</li> </ul>



### **3.4.1 Interview protocols.**

The qualitative instruments were also developed by the researcher in the form of a semi-structured interview. While the main data were collected from children, triangulation data were collected from both the parents and the teacher. Accordingly, three different interview protocols were prepared.

#### ***3.4.1.1 The interview protocol for children.***

The interview protocol for children was composed of a semi-structured interview including several photographs related to recycling issues, such as the recycling symbol, packaging waste (such as paper, plastic, glass and metal) and organic waste (such as dry leaves and residues of fruits and vegetables) conducted with children twice as pre and post. Each interview session lasted approximately 30-40 minutes and was audio-taped. The data collection procedure was carried out in a room with a quiet and relaxed atmosphere which was designated by the school administration. In the room, there was nobody else other than the child and the researcher, and there were no interruptions throughout the interview. Before the data collection procedure started, each child was acquainted with the interview questions, and was told that when s/he became bored s/he could take a break or did not have to go on with the interview. The data were collected from each child individually via a face-to-face interview in the same order. During the interview process, children were given enough time to think about the questions in the interview protocol; moreover, they were encouraged to give detailed answers to the questions. Some questions were asked again when any of the children did not understand the questions and asked for repetition.

The interview protocol was developed by the researcher according to daily plans that took place in the implementation, the research questions of the study and the related literature on eco-management and persuasion behaviors as part of environmentally responsible behavior related to the 3Rs and making compost (Apanomeritaki, 1995; Erdoğan, 2009; Hines, et al., 1886/87; Sivek & Hungerford, 1989/90; Hungerford & Volk, 1990; Kollymuss & Agyeman, 2002; Mony, 2002;

Palmer, 1995). The last draft of the interview protocol included 19 main questions with 8 photographs.

After the last draft was formed, six experts in different fields examined the questions and photographs in terms of comprehensibility, appropriateness of kindergarten children's developmental characteristics and identification of the children's situation in pre-and post-implementation. Three of the experts were in the department of early childhood education and one of them was an academician who was specialized in the field of environmental education and early childhood education, and had work experience with kindergarten children. Also, two of them were not only PhD-candidates but also research assistants in early childhood education and one of them had work experience with kindergarten children. One of the experts was in the department of science education and had conducted studies on environmental education. The other expert was both an early childhood teacher and a PhD- student in psychological counseling and guidance. The last one was an expert in fine arts and the head of the Çağdaş Drama Institution and had been carrying out creative drama sessions with kindergarten children for long years. After the experts' examinations, the required modifications were made, and then, a pilot study was conducted with six kindergarten children to identify the comprehensibility of the interview questions and photographs. The participants of the pilot study were 60-72 month children (four girls, two boys) attending kindergarten at the public elementary eco school that was different from the implementation school in the Çankaya district in Ankara. After the analysis of the pilot study, the questions were rearranged and the final interview protocol consisted of eight photographs and 19 main questions (e.g. "What is an environment?", "How is the environment got polluted?", "When you hear the word 'garbage', what comes to your mind?" "What is garbage?", "Have you ever seen this symbol (the symbol of recycling) in the photograph? If yes, where? and What does it mean?"...etc). After the implementation, one question regarding making compost at school was added to the pre-interview protocol. The interview protocol is presented in Appendix A.

#### ***3.4.1.2 The interview protocol for parents.***

A semi-structured interview protocol was designed to collect triangulation data from parents. This qualitative instrument was carried out to collect data on the parents' observations regarding the alteration in their children's eco-management and persuasion behaviors as categories of environmentally responsible behavior related to the 3Rs and their precursors within the home environment after the implementation and to determine the impact of the implementation on parents' behaviors. Each interview was conducted after the implementation and lasted approximately 15 minutes. During data collection, the same data collection procedure was followed and data were collected under the same physical conditions by the researcher as it was done with the children. While developing the interview protocol, the same experts also examined the questions. After the getting the experts' views, the necessary modifications were made and the final interview protocol was formed. In the interview protocol, there were seven main questions: six pertaining to demographic items (such as, gender, age, income, occupation...etc), while the remaining one was a semi-structured question about the influence of the 3R implementation on alteration in children's, parents' and siblings' behaviors at home. The interview protocol is presented in Appendix A.

#### ***3.4.1.3 The interview protocol for the teacher.***

An instrument containing semi-structured interview questions was constructed to collect data from the teacher in order to triangulate data collected from the children. This instrument enabled the researcher (i) to analyze the children's eco-management and persuasion behaviors as part of environmentally responsible behavior related with the 3Rs and making compost and their predictors at school before the implementation, (ii) to utilize the teacher's observations of the alteration in children's behaviors and their predictors at school after the implementation, (iii) to identify the influence of the 3R implementation on the alteration in the teacher's behavior and (iv) to obtain information regarding the project(s)/ activity (ies) about recycling at school during the 2011-2012 academic year. The interview was

conducted after the implementation and lasted approximately 40 minutes. While collecting data, the researcher followed the same data collection procedure under the same physical conditions, as it was done with the children. The same procedure of forming interview protocols was valid for the teacher. The final interview protocol was comprised of seven main questions: three of them were for demographic information (such as age, teaching experience and graduation), while the remaining four were semi-structured questions (such as “Did the child whose name was ... do recycling before the implementation in the classroom?”, “What kinds of alterations in the ..... named child’s behavior toward environment did you observe after the implementation?”...etc.). The interview protocol is presented in Appendix A.

### **3.5 Data Collection Procedure**

The current study is comprised of three related parts, namely pre-implementation, implementation and post-implementation.

The data collection and implementation procedures were conducted from March to June during the 2011-2012 spring semester. Before the data collection and implementation procedures were initiated, the required official permissions were taken from both the Research Center for Applied Ethics, Middle East Technical University (See Appendix B) and the Turkish Ministry of National Education (See Appendix C). After obtaining the necessary permissions, the researcher visited the selected school to inform them about the nature of the study. Firstly, the school manager and assistant managers were informed about the aim and scope of the study and permission was taken from them to carry out the study in their school. After their approval, their support was requested to encourage children, their parents and their teacher to participate in this research. Secondly, the kindergarten teacher was informed about the aim and scope of the study, and her participation in the research was requested. Her cooperation and support were requested to encourage both children and their parents to join this study as well. Lastly, parents were acquainted with the aim and scope of the study and both their own and their children’s participation in this research were requested. After they agreed to participate in this

study, each of them signed a volunteer participation form and parental consent form for children's participation in this study.

In the second phase, the researcher started spending time with children to become more familiar with children two weeks before the pre-interview. For instance, the researcher and children played several games and made book reading activities. Then, the pre-data collection was initiated. The data were collected from each child via interviews.

After the first set of data collection was completed, the implementation was carried out by the researcher. After the implementation, the second set of data collection was conducted by following the same procedure.

### **3.5.1 The implementation procedure.**

The implementation procedure lasted six weeks. In each week only one daily plan was carried out (See Table 3.3). These daily plans covered the notions of recycling, compost and, reducing, reusing and garbage, together with the goal and objectives related to eco-management and persuasion behaviors as categories of environmentally responsible behavior and their predictors (environmental knowledge, internal locus of control, personal responsibility, and personal investment). The goal and objectives were defined for each activity with respect to the present study's research questions and the guidelines in the 2006 Turkish early childhood curriculum (still prevails). During the implementation process, various teaching methods, such as storytelling, creative drama, field trip...etc, intergenerational learning strategies and related activities, such as making compost, making mini field trips, constructing recycle bins for class...etc. were utilized. Further, alternative assessment techniques, e.g. drawings, play, compost diary...etc. were used to evaluate each activity. What's more, assignments related to the school activities were made to be done at home, e.g. accumulating recyclables at home and a final project in which children and their parents proposed their personal solutions to reduce garbage and waste at home, in order to promote intergenerational learning. All these activities which took place in the daily lesson plans were prepared by the

researcher according to the related literature on early childhood education and environmental education (Akköse, 2008; Apanomeritaki, 1995; Davis, 2009; Duval & Zint, 2007; Erten, 2003; Hines, et al., 1886/87; Sivek & Hungerford, 1989/90; Hungerford & Volk, 1990; Kortland,1997; Lee & Ma; 2006; Scoullos & Maloditi, 2004; McNaughton, 2004; Palmer,1995; Palmer;1999; Yıldırım, 2008). While designing these plans, kindergarten children's developmental characteristics that were described by the Early Childhood Education Program in 2006 and the guidelines, goals and objectives about the learning process and the arrangement of educational environment that were given by this program (MONE, 2006) were considered. After preparations were completed, daily plans were checked by six experts in different fields as in the process of composing the data collection instruments. In addition to the steps followed in forming the data collection instruments, before the implementation phase, daily plans were reviewed again with the teacher at the school where the implementation was carried out. All the daily plans that were arranged and implemented were child-centered. In other words, throughout the six-week implementation, the researcher encouraged children to participate actively in all activities taking place in daily plans, and played the role of a facilitator and guide. Furthermore, kindergarten children's basic science process skills (such as observing, communicating and classifying) and intermediate process skills (inferring and predicting)-categorized by Charlesworth and Lind (1995)-were supported throughout the implementation. It is crucial to promote these basic and intermediate process skills since these skills provide a basis for advanced skills (hypothesizing, defining and controlling variables) and thus the first step is taken to develop scientifically literate future generations (Gallenstein, 2005; Meador, 2003). How these skills were encouraged during implementation was explained in detail while each daily plan was elucidated. Detailed information about the content of the daily activity plans can be found in Table 3.3 below.

Table 3.3 Summary of the Content of the Daily Plans

Daily Plans	Selected Objectives	Type of Instruction	The Science Process Skills Used	Conducted Activities	Assignment
I	to distinguish garbage and materials that are recycled (to attempt) to persuade people and their peers to recycle	creative drama (role-play & dramatization)	observing , communicating, classifying, inferring and predicting	watching a short movie and drawing	to collect the materials that are recycled until the following week
II	to explain the meaning of recycling symbol and how to recycle/reduce/reuse, (to attempt) to persuade people and their peers to recycle, reuse and reduce	creative drama (role-play & teacher in role)	observing , communicating, classifying, inferring and predicting	educational game, composing a story and role play, mini field trip, making recycle bins and game	to collect the peels and residues of fruits and vegetables at home and bring them to class the following week
III	to distinguish garbage and things that are made compost (organic waste) (to attempt) to persuade people and their peers to make compost	creative drama (role-play & dramatization)	observing, classifying, communicating, measuring, inferring and predicting	storytelling, making compost in the garden, making compost in the aquarium, drawing, educational game	no assignment
IV	to tell the name of the materials that are recycled to realize what kinds of materials recyclables are converted into to tell the people/institutions/organizations participating in the recycling process (to attempt) to persuade people and their peers to recycle, reuse, reduce and make compost	creative drama (role-play & dramatization)	observing, classifying, communicating, inferring and predicting	watching a short movie, tell a tale, drawing	to create something (such as material, tool...etc.) or prepare an activity with their parents, related with reducing and/or reusing the garbage and waste at home for the last week
V	to tell the name of the materials that are recycled and what kinds of materials these materials are converted into (to attempt) to persuade people and their peers to recycle, reuse, reduce and make compost	field trip	observing, classifying and communicating	pre-drawing, field trip, post-drawing	to create something or prepare an activity with their parents, which is concerned with reducing and/or reusing the garbage and waste at home for the last week
VI	to suggest what to do to reduce and to reuse garbage and waste to make original products concerning suggestions as to what to do to reduce garbage and waste (to attempt) to persuade people and their peers to recycle, reuse, reduce and make compost	role-play and game, guest speaker	observing , classifying and communicating	educational game, guest speaker involvement, presentation of projects, drawing	no assignment

### **3.5.2 Implementation.**

After the completion of the data collection with pre-interviews with children, the implementation started in the third week of March in 2012. The aim of the implementation was to promote children's eco-management and persuasion behaviors related with the 3Rs as well as making compost. There were several objectives linked with this goal and its predictors, e.g. environmental knowledge, personal investment...etc. as well as those related with daily activity plans' content.

In the first week, daily plan-1 (see Table 3.4) focusing on issues specifically related with solid waste and recycling was implemented. To reach the goal and objectives shown in Table 3.4, various activities and assignments were conducted using creative drama including role-play and dramatization as a teaching method. In daily plan-1, in particular, while examining the photographs, children used various science process skills demonstrated in Table 3.4. For instance, they described and explained the situation in the photographs by using verbal expression and/or role play. What's more, they elucidated what happened in the photographs and what to do/how to solve the issue(s) in the photographs by utilizing inferring and predicting skills. Furthermore, while grouping solid waste as garbage and non-garbage, they also used classifying skills.



Table 3.4

*Summary of the Schedule and Steps of Daily Plan-1*

<b>Steps of Daily Plan</b>	<b>Description</b>
Goal	to develop eco-management and persuasion behaviors related with the 3Rs
Objectives	to distinguish garbage and materials that are recycled  to tell the names of materials that are recycled  (to attempt) to persuade people and their peers to recycle
Type of Instruction	creative drama (role-play & dramatization)
The Science Process Skills Used	observing, communicating, classifying, inferring and predicting
Conducted Activities	watching a short movie and drawing
Assignment	to collect the materials that are recycled until the following week

Daily plan-1 took 120 minutes and consisted of three parts, namely *warm-up*, *improvisation and assessment* (See Appendix D for a Sample Photograph).

In the *warm-up part*, in which children were given the opportunity to prepare for the improvisation part, five photographs were used and their focus was solid waste derived from throwing garbage and waste at various places, such as the forest or the sea. To illustrate, a photograph related with solid waste in the forest derived from throwing garbage (such as clothes) and waste (such as plastic containers, cardboards, nylons) was used. While showing the photograph, children were encouraged to talk about the environmental problem(s) in the photograph and find a solution to such problems by asking open-ended questions, e.g. “What happened at that place? Have you ever seen any place like this? What do you think/feel when you see a place like this? Why?”...etc. Afterwards, five different photographs including different habitats (such as the forest, sea, reed bed...etc.) were distributed around the classroom. Children were asked to examine each photograph carefully, and then to

go to the most favorite one and to imagine as if they were the living things that lived there, and then to make role-play the living things that they imagined. Firstly, children's improvisations including their imaginations and movements related with the living things that lived in that place were listened to and watched. Subsequently, the photos showing a clean habitat were collected and those that showed a polluted environment were given. After that, children's thoughts were asked about this situation via open-ended questions (such as what do you see in these photographs? How does this situation (pollution) occur? If you had to live in this environment, what would you think/feel as the living things that live at that place?...etc.). Lastly, they were requested to state whether all the things that they saw in the photographs were garbage or not. After their replies were listened to, a short movie giving information about recycling, garbage, non-garbage (packaging waste) was watched and the warm-up part was completed.

In the *improvisation part* dramatization was carried out. They dramatized the events that took place in the movie (such as throwing coco-cola can to the ground, putting garbage separately from packaging waste). Before the dramatization process, role cards, as many as the number of characters in the movie, were distributed to the children according to their desire, and they were asked to play their role. After all the children had participated, this process was completed.

In the *assessment part*, children were inquired about the thoughts and feelings regarding their roles and the events in the movie. Then, their drawing pads were delivered, and they were requested to fold one sheet into two parts and draw the things that were garbage on one side and the things that were not garbage on the other side. After sharing their drawings, plastic bags with a recycling symbol on them were distributed to all children and they were requested to collect the materials that were recycled until the following week. Thus, the first daily plan was completed. (During this activity, no information about the recycling symbol was given to the children.)

In the second week, daily plan-2 (see Table 3.5) focusing on recycling was implemented. Distinct activities and assignments were performed by utilizing creative drama including role-play and dramatization as a teaching method in order to achieve the goal and objectives shown in Table 3.5. While conducting activity plan-2, children used various science process skills demonstrated in Table 3.5. For example, when examining the materials in the classroom with magnifying glasses, children used observing skills. While talking about/discussing the properties of the materials, they performed communicating skills and they also identified the properties of the materials by utilizing classifying skills. Moreover, while guessing what happened to the classroom they used inferring skills. Besides, when they tried to find solutions about converting the class to its former situation (clean) they carried out predicting skills.

Table 3.5

*Summary of the Schedule and Steps of Daily Plan-2*

<b>Steps of Daily Plan</b>	<b>Description</b>
Goal	to develop eco-management and persuasion behaviors related with the 3Rs
Objectives	to distinguish garbage and materials that are recycled (packaging waste)  to explain the meaning of the recycling symbol and how to recycle/reduce/reuse,  to tell the names of materials that are recycled  (to attempt) to persuade people and their peers to recycle, reuse and reduce
Type of Instruction	creative drama (role-play & teacher in role)
The Science Process Skills Used	observing, communicating, classifying, inferring and predicting
Conducted Activities	educational game, composing a story, mini field trip, making recycle bins and game
Assignment	to collect the peels and residues of fruits and vegetables at home and bring them to class the following week

The daily plan-2 took 180 minutes and consisted of three parts, namely *warm-up, improvisation and assessment* (See Appendix D for a Sample Photograph).

In the *warm-up part*, children were prepared for the improvisation part. When children were outside of the classroom, the materials with and without a recycling symbol, the products made up of recyclables and the materials that could not be recycled were scattered all over the classroom. Then the children were called into the classroom. After entering the classroom, they were asked questions to encourage their curiosity (e.g. Oh my God! What happened to this classroom?). Afterwards, magnifying glasses were distributed to them to role play a detective and to research /find a clue related with the cause(s) of this situation in the classroom. To determine the duration of their research, the song of the film “Pink Panther” was played. For instance, children continued to research /find a clue as detectives until the song of the pink panther finished. After the song finished, they were asked whether they had found any clue or not. According to the children’s replies, the song was played again and they were asked to look over the materials carefully as to whether there was a common thing on the materials. After the examination, they were encouraged to reach the answer “recycling symbol” as the common thing on the materials. They were asked whether they had seen this symbol and whether they knew its meaning. It was understood that most of them had seen the recycling symbol before but a great majority of them did not know the meaning of the symbol. Therefore, the meaning of the symbol was explained by means of a power point presentation. While making an explanation about each arrow of the recycling symbol, how children could recycle, reuse and reduce was discussed. After sharing this knowledge, a game related with the meaning of the three arrows of the recycling symbol, namely “reduce, reuse and recycle” was played. In this game, three different places which represented recycle, reuse and reduce were identified by colorful titles, such as green for recycle, blue for reduce and red for reuse. Then the rules of the game were explained. When any one of the words *recycle*, *reuse* or *reduce* was uttered, children had to go to the place where the title of recycle, reuse, or reduce was found. If someone went to an

incorrect place, s/he would get out of the game. The game continued until one child remained. After the game, this part was completed.

In the *improvisation part*, role-play was carried out. Children were divided into five groups by choosing colorful cards from the bag. After the groups were formed, they were asked to select one of the materials that had been scattered all over the class. Then, they were told that each of the material they had selected had a story. In addition, they were requested to think about its story and to freeze when they were ready. Afterwards, they were asked to tell their own stories as if that material was speaking. After all the children were listened to, they were requested to compose a new story about their materials as a group and to freeze when they were ready. Afterwards, they were requested to tell their stories as if their materials were speaking. When storytelling was completed, they were asked about what to do to convert the class into its original state, i.e. its tidy state. They were encouraged, through open-ended questions, to reach the answer “throwing waste into the recycle bin”. Before designing their own recycle bins, they were given opportunity to investigate the recycle bins that were found within the school environment by taking a mini trip and this part was completed.

In the *assessment part*, when the trip was completed, they came to the classroom and they talked about the trip and were asked the places of the recycling bins and which materials were thrown in them. After this discussion, children were guided to reach the answer “constructing recycle bins for class” by asking open-ended questions e.g. What we can do to convert our class into its former, tidy condition? Where should we throw paper, plastic, glass and metals?... etc. In addition, they were divided into four groups and supported to construct recycle bins for their class. Then, a game whose name was “throwing waste into the appropriate recycle bin” was played. At the end of the game, the group that threw the most waste into the appropriate bin won the game. At the end of the game, together with the children, all the things thrown into the bins were examined carefully to see whether the materials were thrown in the correct bin. If there were material that was thrown into the incorrect bin, it was taken out and thrown into the correct bin. Lastly, they

talked about why we should throw garbage and waste separately. Then plastic bags were delivered to the children and they were asked to collect the peels and residues of fruits and vegetables at home and bring them to the class the following week, and thus, daily plan-2 was completed.

In the third week, daily plan-3 (see Table 3.6) that focused on making compost was implemented. To accomplish the goal and objectives shown in Table 3.6, divergent activities were conducted via utilizing creative drama including role-play and dramatization as a teaching method. While implementing daily plan-3, children used different science process skills demonstrated in Table 3.6. To illustrate, while talking about vegetables' and fruits' properties, children used observing and classifying skills. Furthermore, they also used classifying, while playing in the general assessment part. In addition, when they formed their compost diaries by drawing the change in the compost and talking about/discussing their drawings, they also performed communicating skills. Moreover, when they observed the change in the compost, they also used measuring skills. Furthermore, they used inferring and predicting skills during the improvisation part when they did role- plays as if they were Zeynep /Mehmet and guessed what could happen after that.

Table 3.6

*Summary of the Schedule and Steps of Daily Plan-3*

<b>Steps of Daily Plan</b>	<b>Description</b>
Goal	to develop eco-management and persuasion behaviors related with the 3Rs including making compost
Objectives	to distinguish garbage and things that are made compost (organic waste)  to explain how compost is made with the peels and residues of fruits and vegetables and dry leaves  (to attempt) to persuade people and their peers to make compost
Type of Instruction	creative drama (role-play & dramatization)
The Science Process Skills Used	observing, classifying, communicating, measuring, inferring and predicting
Conducted Activities	storytelling, making compost at garden, making compost in the aquarium, drawing, educational game
Assignment	no assignment

This daily plan consisted of four main parts, namely *creative drama* comprised of the warm-up, improvisation and assessment sub-parts, *making compost in the garden, making compost in the class and general assessment*. The first two parts were implemented on the same day and took 100 minutes, and the remaining parts were applied in the following day and took 90 minutes (See Appendix D for a Sample Photograph).

In the *warm-up sub-part*, children were prepared for the improvisation part. First of all, the activities that were done during the previous week were mentioned. Then, the children were asked “What do you understand when we say vegetable or fruit? Do you they like eating fruits/vegetables? Why? What are your favorite fruit(s)/vegetable(s)?”. Afterwards, they were inquired about what they did to the peels and residues of fruits and vegetables at home, and their replies were listened to. Then, a story on what Zeynep and Mehmet did with the peels and residues of fruits and vegetables was told. Then, the story about what could be done with the peels and

residues of fruits and vegetables as well as dry leaves at home, in the garden was told, and thus, this part was completed.

*The improvisation sub-part* included dramatization and role-play. While telling a story, the story was interrupted from time to time, and children were requested to guess what would happen in the rest of the story and to play it as if they were Zeynep and Mehmet. In this way, the storytelling was completed. After storytelling, they were asked “If you were Mehmet what would you advise Zeynep to do?” and “Why?” Then, they were requested to act out their advice as if they were Zeynep and Mehmet, and thus, this part was completed.

In the *assessment sub-part*, children were asked about their roles and the process of drama, and then, a break was given and preparations were made for making the compost.

*Making the Compost in the Garden* (The compost got ready in eight weeks.)

Before making the compost, children were asked what they had brought to school on that day and why they had been asked to bring them. They were encouraged to arrive at the answer of “compost”. The peels and residues of fruits and vegetables were brought by children and the dry leaves that were collected before were used to make compost at an appropriate place in the school garden.

*The process of making the compost:*

An area of 1-1.5 square meters was used to make the compost. This area was surrounded by wooden crates made up of natural materials to enable the compost to breathe sufficiently. The area where the compost was made was excavated at a depth of 20cm with the help of the cleaning attendants. The materials used to make compost were thrown into the 20cm-deep hole. Then, soil was thrown over them, forming a 20-centimeter layer above it. This process was done again until the height of the compost reached 1.5 meters. When the height was 1.5 meters, the top layer of the compost was covered with a 10-cm layer of soil. Water was added into the



compost to moisturize it from time to time. In addition, the compost was mixed at regular intervals of time with a spade.

When the process of making compost was completed, just before its top layer was covered with soil, children were asked to draw a picture of what they saw there.

### *Making Compost in Class*

Before the general assessment was done, a mini compost was also made the following day in the aquarium in class because the air conditions were appropriate and the changes in the compost could be observed easily. In addition, the changes in the compost in the garden were followed; however, the pictures of the changes occurring in the compost in the aquarium were drawn instead of those of the compost in the garden.<sup>1</sup>

*General Assessment:* After making compost in the aquarium, children were asked to choose a card from the bag and then to get together with the other children who had the same number on the card. After the groups were formed, the photographs showing the steps of an organic waste converting into compost were delivered to each group. They were requested to arrange the photographs according to the steps of making compost correctly and the group that completed the arrangement of the photographs fast and correctly won the game. After the game, the group that won the game explained the steps of making compost to their friends. Lastly, the activities that took place in daily plan-3, and why we should separate organic waste and leftovers were discussed, and thus, daily plan-3 was completed.

In the fourth week, daily plan-4 (see Table 3.7) that focused on the process of recycling and its importance was implemented. To achieve the goal and objectives shown in Table 3.7, several activities and assignments were conducted via using creative drama including role-play and dramatization as a teaching method. Throughout daily plan-4, children utilized various science process skills demonstrated in Table 3.7. For instance, while examining the materials that were

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<sup>1</sup> When the compost is mixed from time to time, children are asked to draw the picture of what they saw. In this way, every child formed his/her own diary related with the compost.

thrown into the recycle bins in the classroom, they used observing (defining properties), classifying (grouping them as paper, plastic, metal and glass) and communicating (talking about/discussing the operational definitions) skills. In addition, during the improvisation stage, they used inferring and predicting skills when they did role-play as if they were characters of the story and guessed what would happen next or found solutions to the problems in the tale.

Table 3.7

*Summary of the Schedule and Steps of Daily Plan-4*

<b>Steps of Daily Plan</b>	<b>Description</b>
Goal	to develop eco-management and persuasion behaviors related with the 3Rs
Objectives	to tell the name of the materials that are recycled and these materials are converted to what kinds of materials
	to tell the people/institutions/organizations involved in the recycling process
	to explain the importance of recycling
	(to attempt) to persuade people and their peers to recycle, reuse, reduce and make compost
Type of Instruction	creative drama (role-play & dramatization)
The Science Process Skills Used	observing, classifying, communicating, inferring and predicting
Conducted Activities	watching a short movie, telling a tale, drawing
Assignment	to create something or prepare an activity with their parents, related with reducing and/or reusing garbage and waste at home for the last week

Daily plan-4 took 100 minutes and consisted of three parts, namely *warm-up*, *improvisation and assessment* (See Appendix D for a Sample Photograph).

In the *warm-up part*, the activities that were done in the previous week were discussed. Then, children were asked whether they used the recycle bins in the class or not, and the materials that were thrown were investigated together to see if they were thrown into the appropriate bins. While examining, children were asked

whether or not all the materials were recycled, all recyclable materials were thrown into all kinds of recycle bins, and how they could understand how materials were thrown into any recycle bin. Then, a short movie showing what kinds of materials were recycled, how they were recycled, which people, institutions and organizations were involved while these materials were recycled, and what to do so that these materials could be recycled was watched. Afterwards, they were encouraged to talk about the content of the movie. Following the discussion on the movie, a tale regarding the importance of recycling was told, and thus, this part was completed.

In the *improvisation part*, dramatization and role-play were carried out. The tale was told by changing the tone of voice and speaking like the people in the tale. In addition, the tale was interrupted from time to time, and children were asked to guess what would happen next or find solutions to the problems in the tale and they were given opportunity to make improvisation about their guesses and solutions. After the tale was told, they were asked if this tale was real, what had happened, and what they would do; in addition, they were asked to make improvisations of these. After all the improvisations, this part was completed.

In the *assessment part*, they were encouraged to talk about the activities that were done during the day. Then, they were asked to draw a picture related with these activities. When they finished drawing, they were requested to describe their pictures to their classmates. In addition, for the following week, they were asked to create something or prepare an activity, together with their parents, which was related with reducing the garbage and waste at home, and thus, daily plan-4 was completed.

In the fifth week, daily plan-5 (see Table 3.8) that focused on field trip to a recycling center was implemented. Divergent activities and assignments were conducted via using field trip as a teaching method in order to attain the goal and objectives shown in Table 3.8. Throughout activity plan-5, children utilized various science process skills demonstrated in Table 3.8. To illustrate, during the field trip, children used observing (describing properties of material at the recycling center), classifying (grouping them as paper, plastic, metal and glass) and communicating

(talking about/discussing the operation definitions) skills. Moreover, they also performed communicating skills while they were explaining their drawings to their friends after the field trip.

Table 3.8

*Summary of the Schedule and Steps of Daily Plan-5*

<b>Steps of Daily Plan</b>	<b>Description</b>
Goal	to develop eco-management and persuasion behaviors related with the 3Rs
Objectives	to explain the importance of the recycling center
	to tell the name of the materials that are recycled
	to realize the kinds of materials the recyclables are converted into
	to tell the people/institutions/organizations involved in the recycling process
	to explain the importance of recycling
	(to attempt) to persuade people and their peers to recycle, reuse, reduce and make compost
Type of Instruction	field trip
The Science Process Skills Used	observing, classifying and communicating
Conducted Activities	pre-drawing, field trip, post-drawing
Assignment	to create something or prepare an activity with their parents, which is related with reducing and/or reusing the garbage and waste at home for the last week

This daily plan took 180 minutes and consisted of three parts, namely *the agenda before the field trip, the agenda during the field trip and the agenda after the field trip* (See Appendix D for a Sample Photograph).

In the part of *the agenda before the field trip*, brief information was given about the destination. Before going on a trip, children were told that they were going to the recycling center at Middle East Technical University, one of the public universities located in Ankara. To raise their curiosity, they were asked questions,

such as “Have you been to the recycling center before,? What kinds of things are there? What can we do there?” Subsequently, children were asked to draw the picture of the recycling center. After they had completed their drawings, they were requested to explain to their classmates what they had drawn. After their description was completed, a list of questions was made with the children to ask to the staff at the recycling center (e.g. What is the name of this center? Who works at this center? ...etc.). Then, children were informed about the things and rules that they had to be careful about.

In *the agenda stage during the field trip*, first of all, the staff was introduced to the children, and information was given about their occupation. Then, the center was toured. During the field trip, children were encouraged to ask the staff the questions that had been determined before the field trip, and also the ones emerging during the field trip.

In the part of *the agenda after the field trip*, they were asked whether they had been able to get the replies of the questions that had been determined before, and they were requested to draw the picture of the recycling center to show it to their parents.

In the last week, daily plan-6 (see Table 3.9) that focused on recycling and reducing garbage and waste was implemented. To realize the goal and objectives shown in Table 3.9, several activities were conducted using role-plays and a guest speaker as teaching methods. While implementing daily plan-6, children used divergent science process skills demonstrated in Table 3.9. For example, while playing, children used observing (identifying properties of materials at the cards), classifying (grouping them as paper, plastic, metal and glass) and communicating (talking about/discussing the operation definitions) skills. Moreover, they used communicating skills while explaining their projects.

Table 3.9

*Summary of the Schedule and Steps of Daily Plan-6*

<b>Steps of Daily Plan</b>	<b>Description</b>
Goal	to develop eco-management and persuasion behaviors related with the 3Rs including making compost
	to distinguish garbage and materials that are recycled (packaging waste)
Objectives	to suggest what to do to reduce and to reuse garbage and waste
	to make original products concerning suggestions as to what to do to reduce garbage and waste
	(to attempt) to persuade people and their peers to recycle, reuse, reduce and make compost
Type of Instruction	role-play and guest speaker involvement
The Science Process Skills Used	observing , classifying and communicating
Conducted Activities	educational game, guest speaker involvement, presentation of projects, drawing
Assignment	no assignment

This daily plan took 120 minutes and consisted of four parts, namely *role play and educational game, guest speaker involvement, presentation of the project and assessment* (See Appendix D for a Sample Photographs).

In the part of *role play and educational game*, first of all, the previous week's field trip was discussed among the children. While talking about the trip, they were asked questions, such as what the name of the place they went to was, what they saw there, who worked there and what their responsibilities were etc. Then the children were asked to form the sculpture of the people and the things that they saw there. Afterwards, when each child was tapped, s/he explained whose sculpture s/he had made. Then, they were requested to select a card from the bag on which there was a picture of recyclable and non-recyclables. They were given time to examine the cards. While they were examining the cards, the recycle bins that were found in the

class were put in different places. Then, the rules of the game were explained. (They were asked to change their cards with their classmates until the end of the music, and when the music stopped, they looked at the cards and immediately went to the appropriate recycle bin where they had thrown them. The child who went to the incorrect/inappropriate recycle bin, and considered non-recyclables as recyclables got out of the game. The game continued until only one child remained. After the game, children were told a guest speaker had come from the Environmental Protection and Packaging Waste Recycling Recovery and Recycling Trust (ÇEVKO) to talk with them about garbage and waste and to distribute books about recycling. Then, they were encouraged to think about and form some questions they wanted to ask. Afterwards, a break was given, and this stage was completed.

*In the part of guest speaker involvement*, firstly, the speaker was introduced to the children. Then, it was time for the speaker. The speaker gave information about “the environment, how the environment is polluted, environmental pollution, kinds of environmental pollution, what to do to reduce garbage and waste, what to do to reuse and recycle waste, how wastes are recycled, and the people/institutions/organizations that participate in the recycling process” via a power point presentation. After the presentation ended, children asked questions that they were curious about, and then, the speaker gave out books on recycling that were prepared and published by ÇEVKO. Afterwards, this part was completed, and a break was given.

In the *presentation of the project* part, the projects about “how garbage and waste at home can be reduced”, which were prepared by children and their parents, were presented. Firstly, children were given time to prepare their project for the presentation. Then, they were given opportunity to present their project to the classmates. After the presentations, this part was completed.

In the *assessment part*, the activities that had taken place during the day were discussed. Then, they were asked to draw a picture about the inspirational events that

had happened that day. After they finished drawing, they explained their drawings to their classmates. Afterwards, the daily plan was completed.

After the implementation, data were collected from interviews to identify the influence of the treatment on children's eco-management and persuasion and their precursors (such as environmental knowledge, situational factors, and environmental attitude). While collecting data from each child, the researcher followed the same procedure as in the pre-interviews. The data were collected under the same physical conditions. The difference between the pre- and post-interview was that after the 3R implementation in school, one question was added to the post-interview protocol to identify children's behavior and its predictor, environmental knowledge related to making compost. Hence, each interview session lasted approximately 20-30 minutes.

In addition, to get detailed information about children's behaviors and their predictors at home before and after the 3R implementation and to obtain demographic information about them, data were collected from each parent by means of interviews after the 3R implementation. Moreover, the researcher conducted a face-to-face interview with the kindergarten teacher at school to examine the children's behaviors and their precursors before and after the implementation.

### **3.6 Data Analysis Procedure**

In the present study, open coding data analysis procedure and constant comparative method were used as proposed by Glaser and Strauss (1967). In the process of open coding, each part of the data is examined to describe what the data exactly means and to form certain categories that explained the data sufficiently (Boeije, 2002; Creswell, 2007). On the other hand, in the constant comparative method, which is commonly used in all kinds of qualitative studies, one part of the data is compared with another part of the data to identify the similarities and differences, and data are classified on a similar dimension. Later, this dimension is given a provisional name, and then, it becomes a category (Merriam, 2009). Similarly, the consistency of the data as a whole is examined by comparing different parts of the data during open coding (Boeije, 2002). In other words, open coding is



data analysis which is interlinked with and which makes use of the constant comparative method.

According to Tesch (1990),

“The method of comparing and contrasting is used for practically all intellectual tasks during analysis: forming categories, establishing the boundaries of the categories, assigning the segments to categories, summarizing the content of each category, finding negative evidence, etc. The goal is to discern conceptual similarities, to refine the discriminative power of categories, and to discover patterns” (p.96).

Afterwards, all the audio-taped interviews were transcribed verbatim for each data source, namely child, parent and teacher, and were read entirely. After the reading, the data were analyzed separately with respect to the timeline of data collection (before the implementation and after the implementation) and data collection sources (child, parent and teacher).

Firstly, before the implementation, the data that belonged to each child were collected via interviews, were analyzed and divided into categories. While some of the codes emerged in connection with related literature, some of them emerged during the analysis. All the codes were grouped into various categories. These codes, categories and their descriptions were composed in the light of the conceptual framework of the Hines Model of REB (Hines et al., 1986/87) and the Environmental Behavior Model (Hungerford & Volk, 1990) and previous research. After the analysis of the data related with the pre-implementation stage was completed, the data analysis pertaining to the post-implementation stage began. The same procedure was followed for the data obtained after the 3R implementation. After all the analyses of the data collected from children during both pre-and post-implementation stages were completed, the emerging codes and categories were compared. While some of them did not emerge in the data before the implementation, some of them appeared in both data sets: before and after the implementation. These codes were derived from the interviews held with children. The findings were supported by means of analyzing the data obtained from the interviews held with the children’s parents and teacher. The data obtained from the parents’ and teacher’s interviews after the implementation were analyzed following the same procedure as it was done

with the data sets obtained from children. The categories and codes used for data analysis and sample excerpts are presented in the following section.

### **3.6.1 Sample quotations illustrating the codes and categories.**

The description of categories, namely personality factors, cognitive factors and external factors, as well as the descriptions of codes, which are environmental attitudes, locus of control, personal responsibility, intention to act, and personal investment, environmental knowledge and situational factors were constructed according to the Hines Model of REB and the Environmental Behavior Model. For detailed information about the descriptions of codes please see Section 1.4. The sample quotations illustrating the codes and categories that took place in the current study are presented in Table 3.10 below.

Table 3.10

*Sample Excerpts Illustrating Codes and Categories of Kindergarten Children's Eco-Management and Persuasion Behaviors' Predictors*

Categories	Codes	Sample Excerpts
Personality Factors	Environmental Attitude	<p>"...Sometimes I feel bad about throwing it on the street."</p> <p>"She strives to collect especially packaging waste separately; however, we ignore her efforts..."</p>
	Locus of Control	"I have not mentioned recycling to my mother and father but I need to do it. If I told them about it, I would do it."
	Personal Responsibility	"I dispose of it [garbage] into a garbage bin because I am a nice person".
	Intention to Act	"I have not started to do it [recycling] yet because we have not found a plastic bag. However, I am going to find a bag and I will start doing it...and throw things into the recycle bin..."
	Personal Investment	<p>"Worse things will happen. Things will become really polluted. The dumping grounds will become bigger, bigger, and then a mountain of garbage will spread out all over and everybody will wish they hadn't thrown things away and will cry. Therefore they will be really worried. If the garbage becomes bigger like that, there will be no place for us, animals and plants to live and it will cause damage. Then all the animals may escape and plants may wilt. Animals will escape to the place where people recycle. In other words, we should recycle so there will be less garbage and pollution"</p> <p>"We will not be able to buy the goods that we use anymore. We will spend money unnecessarily to buy them"</p>
Cognitive Factor	Environmental Knowledge	"No, I do not recycle because I do not know how to recycle."
External Factor	Situational Factors	"I always dispose of it [garbage] into a garbage bin because there is a rule related with this [throw your garbage into the garbage bin]"
		"No, I do not recycle because we do not have a recycle bin".
		"No, I do not recycle. They [the teacher and assistant teacher] do not allow us to recycle because we are too young".

### **3.7 Trustworthiness of the Study**

In order to make a study trust-worthy, there are certain procedures that are proposed by experts. According to Merriam (2009), to ensure the trustworthiness of qualitative studies, the researcher should check validity and reliability issues by means of some strategies.

#### **3.7.1 Validation of the study.**

Various strategies to assess the accuracy of the findings are suggested by researchers (Creswell, 2009). According to Creswell (2007), at least two of these strategies should be carried out by qualitative researchers. In this study, as proposed by Denzin (1978), of the method of gathering multiple sources of data, which is one type of a triangulation strategy, was used. In the present study, the strategy “use multiple data source” was fulfilled by collecting data from children, parents and teacher via interviews.

The other strategy that was carried out was “spend prolonged time in the field” as proposed by Creswell (2009). The implementation lasted six weeks; however, the researcher started to spend time with the children to become more familiar with them two weeks before the implementation. In addition, she continued to go to the implementation school regularly three days a week until the school was closed for the summer holiday. Hence, the researcher had a chance to observe the participants and to make contact with them more closely in their real setting.

#### **3.7.2 Reliability of the study.**

There are several ways to reveal that the approach of the research is consistent across various researchers and projects (Gibbs, 2007).

In the present study, the strategy “check transcripts to make sure that they do not contain obvious mistakes made during transcription” as suggested by Gibbs (2007) was used. In addition, inter-rater (coder) reliability that is used for the clarity of the codes as proposed by Miles & Huberman (1994) was ensured. To meet this

reliability, first of all, data were read by different researchers (Miles and Huberman, 1994). The first coder was the researcher and the second coder was a doctoral candidate in the department of science education and had interest in environmental education. They read and coded the data on their own. Then, they met and discussed the codes and themes. After the researchers reached an agreement on the themes, codes and sub-codes, a reliability analysis was performed using the following formula by Miles and Huberman (1994);

Reliability = number of agreements / (total number of agreements+ disagreements)

As a result, the inter coder reliability was calculated as .95 which was more than the desired level, which is .80 suggested by Miles and Huberman (1994). In other words, the inter coder reliability was fulfilled.

## **CHAPTER IV**

### **FINDINGS**

This chapter presents the findings regarding the changes in kindergarten children's eco-management and persuasion behaviors, as part of environmentally responsible behavior, as well as their predictors relating to the 3Rs (recycle, reduce, reuse) and composting both in the school and home environments. These changes were investigated over the course of a six-week 3R implementation involving various hands-on and minds-on activities. The perceptions of the parents and teachers of children's behaviors are also presented. Specifically, in this chapter, the findings regarding the impact of the 3R implementation on the changes in children's eco-management and persuasion behaviors both at home and in the school environment, the effect of the implementation on the predictors of eco-management and persuasion behaviors exhibited by kindergarten children and the influence of the implementation on the changes in their parents' and teacher's behavior and perceptions regarding 3R including composting are given.

#### **4.1 The Influence of the 3R Implementation on the Children's Behavior**

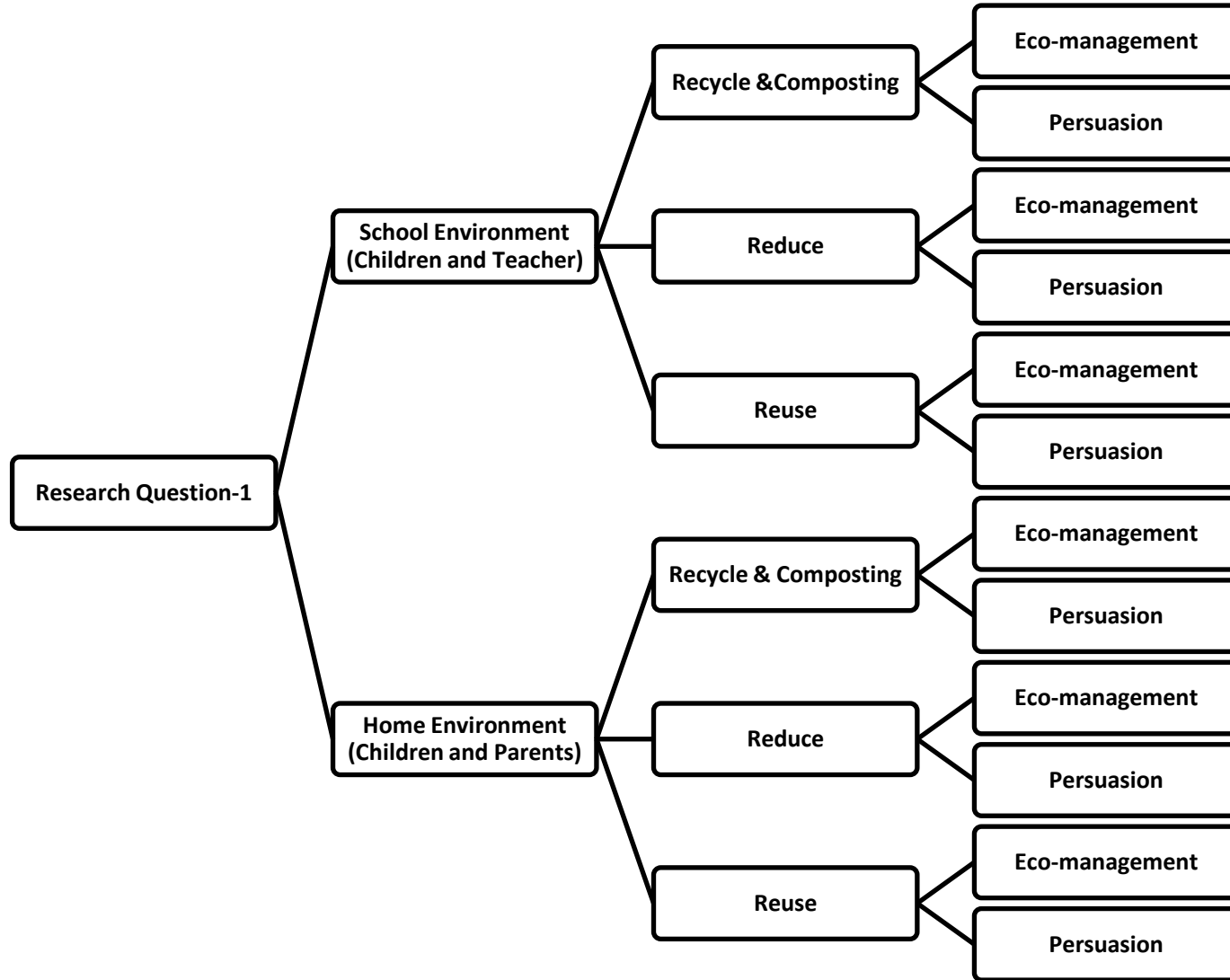
In this section, children's responses to the first research question are presented.

RQ-1: How does the 3R implementation influence kindergarten children's behaviors in relation to the 3Rs as part of environmentally responsible behavior?

- a) To what extent does the 3R implementation influence kindergarten children's eco-management behaviors within both the school and home environments?
- b) To what extent does the 3R implementation influence kindergarten children's persuasion behaviors within both the school and home environments?

The findings regarding the change in the children's eco-management and persuasion behaviors in relation to the 3Rs are presented in two phases. First, the pre-implementation phase includes an analysis of the kindergarten children's eco-management and persuasion behaviors in both school and home before the 3R implementation. The data for this phase was collected from face-to-face interviews with the kindergarten children. In the second post implementation phase, the changes in kindergarten children's eco-management and persuasion behaviors after the implementation are presented. In this phase, the data was collected qualitatively through face to face interviews from the children, their parents and the teacher (See Figure 4.1).

The related findings are organized as follows: Firstly, data collected from children is given. Secondly, the data gathered from the teacher is presented. This data is used to shed light on the evaluation of changes in the children's behaviors during the course of investigation within the school environment. Lastly, the analysis of the data collected from parents through interviews is depicted to further clarify probable alterations that occurred in the children's behavior at home.



4.1 Diagram of the findings related to the first research question.



#### **4.1.1 Findings from the Pre-Implementation Phase**

In this phase, the findings obtained from kindergarten children, parents and the teacher are summarized under “Recycling and Composting”, “Reduce/Reducing Consumption” and “Reuse” subsections. In each part, first the findings related to the school environment, and then those related to the home environment are presented. While presenting the findings pertaining to the school environment, first, the results related to the children, and subsequently, the results related to the teacher are explained. The findings pertaining to the home environment begins with the presentation of the results from the children followed by the results from the parents. The letter C with a number to identify the participants follows the sample extracts from the children’s responses. The numbers, 10 and 24, are used for the twins. Also, text in brackets [ ] complete the meaning that the children try to express during the interview. For the sample extracts from the parents’ responses the letter P together with a number is used.

##### ***4.1.1.1 The kindergarten children’s perceptions of recycling and composting.***

The kindergarten children’s eco-management and persuasion behaviors related to recycling, and then to composting are presented separately with respect to the school and home environments.

##### ***4.1.1.1.1 The kindergarten children’s perceptions of recycling.***

Thirteen children out of the 24 said that they did not recycle at school, while the remainder (n=11) reported that they did. In fact, the teacher’s response regarding recycling at school revealed that none of the children recycled at school. For instance, a child who claimed to recycle at school stated that “*sometimes the teacher does it [recycling] and wants us to do it [recycling] too so I do it [recycling]*” (C,16). However, the teacher said, “*Before your research, there was no recycling opportunity in our school...There were no recycle bins in the classroom.*”

In terms of the home environment, the majority of children said that they did not recycle at home. A few reported that their parents recycled at home but they did not actively participate in this process. The interviews with parents also confirmed these findings. In fact, it was understood that only two children sometimes helped their parents separate paper or plastic bottle caps<sup>2</sup> and the twins attempted to persuade their parents to recycle.

Sample extract from parents' responses related to their children's recycling behavior at home are presented below:

.... While I am collecting plastic bottle caps, he says, "Mom I am putting the cap into the recycle bin". ... He also knows that things made up of paper are thrown into a separate recycle bin located in his father's room. He knows that and tries to help me... (P, 5).

... They [twins] encourage me to recycle. After being informed at school while preparing fashion show they asked me whether we had a recycle bin at home and why we did not do recycling at home. After this conversation we started recycling, but not regularly (P, 10 & 24).

#### ***4.1.1.1.2 The kindergarten children's perceptions of composting.***

This sub-section presents findings concerning the behavior of the kindergarten children relating to composting in the school and home environments. The findings obtained from the interviews with the children and teachers showed that they did not have any prior experience in relation to composting at the kindergarten (See 4.1.2.1.2 for detailed information).

At home, all the children except one, said that they disposed of organic waste in the garbage bin. The child who said that she and her mother composted stated, *"After a meal, we collect the remains of the apple and its peel in a separate bag (i.e. plastic bag) because we do not have a recycle bin at home. We just have one garbage bin at home in the kitchen. My mother composts and she teaches me how to compost.*

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<sup>2</sup> At the time of the study, non governmental organizations embarked on a national wheelchair campaign in which bottled water companies were committed to supplying a disabled person with a wheelchair for every 1000 bottle caps returned to them.

*For example, I take the apple peel from the plastic bag and bury it in the garden. Next, I put paper on top of the apple peel. This is followed by the addition of the remaining apple peel on the paper. They remain there for several days. I water them for a few days. Then, they become compost... ” (C, 20).*

In fact, the analysis of the parents’ interviews indicated that two children had experience in making compost. Excerpts from the parents’ interviews are given below:

We make compost from organic waste. We have been composting for seven months... (P, 20).

We sometimes make compost from fruit peel. We bury them under the soil in a pot and then water it. However, it is not possible to make compost from every kinds of organic waste due to the lack of space. Therefore, the great majority of organic waste is thrown into the garbage bin (P, 18).

Thus, it can be seen from the responses from the children, their parents and teachers that most of the children did not recycle or compost in the school and home environments prior to the study intervention.

#### ***4.1.1.2 The kindergarten children’s perceptions of reduce/ reducing consumption.***

This section consists of the results obtained from the analysis of the kindergarten children’s behaviors relating to reduce/reducing consumption. The analysis revealed that only one child aimed to reduce resource consumption. She said, *“We should not buy so much food and beverage...so that nature is not polluted” (C, 9).*

The remainder of the children did not consider reduce/ reducing consumption as an alternative. Rather, they indicated that they generally threw the things they did not need into the garbage bin. For instance, one child (4) remarked, *“We should throw the excess into the garbage bin...”*

Both the teacher and parents also acknowledged that children did not carry out any implementation related to reduce /reducing consumption within both the home and school environments.

#### ***4.1.1.3 The kindergarten children's perceptions of reuse.***

In this section, findings regarding the kindergarten children's behaviors related to *reuse* are portrayed and supported by extracts from the interviews with the parents and teacher.

Kindergarten children's explanations in the following excerpts reflect their perceptions of the term '*reuse*':

... For example, while drawing pictures, I use both sides of the paper ...I draw pictures in the empty spaces as well... (C, 8).

I reuse the paper that is not needed. Once I tried to construct an elephant...(C,9).

... I make artistic creations from them [recyclables] such as a robot... (C, 3)

The teacher's accounts of the children's reducing behavior verified the children's responses:

The children and I organized an exhibition, fashion show, related to recycling at school. We designed clothes from recyclable items such as newspaper, plastic bags, etc...They [my students] keep these clothes at home carefully. However, this has been the first exhibition relating to recycling, since I started working at this school 12 years ago.

The parents' responses also confirmed the children's responses in the following excerpts:

... My son and I do some activities together. For example, for school activities we design animals using walnut shells. We also construct animals from straws. We only do such activities only when it is required by the school administration or teacher (P, 4).

There was a fashion show and exhibition [related to reusing materials] at school. After this, my son said, 'Mom, we should not throw away

chocolate packaging after eating the chocolate; we can use them to make planes and ships (P, 5).

... My children design things like robots from straws and bottles. They construct toys using toilet paper rolls, paper towels and plastic bottles on their own. They also participated in a project [fashion show and exhibition related to reusing materials] at the school. However, we do not frequently reuse materials... (P, 10 & 24).

In fact, children are more knowledgeable than us because they can learn and improve their knowledge at school. For the project [fashion show and exhibition related to reusing materials], we collected a lot of glass and prepared a project using them. Later, my daughter made things like caterpillars using the caps from mineral water bottles (P, 20).

Overall, in the pre-implementation phase, within both school and home environments, although almost none of the children recycled and composted; but a few children attempted to reuse material and reduce consumption. These outcomes were confirmed by the responses given by the teacher and the parents.

#### **4.1.2 Findings from the Post-Implementation Phase**

This section contains the findings attained from interviews with the kindergarten children, their parents and teacher. The related findings are presented under three headings, namely “Recycling and Composting”, “Reduce/Reducing Consumption” and “Reuse”. Each part begins with the presentation of the findings in relation to the school environment, followed by those concerning the home environment.

While presenting the findings related to the school environment, firstly, the results based on the accounts given by children, and then, those based on explanations by the teacher are elucidated. When children’s extracts were transcribed, in addition to other symbols indicated at previous sub-sections, {} is used to show the expressions/statements that children cited from the stories and videos used during the implementation.

#### ***4.1.2.1 The kindergarten children's perceptions of recycle and composting.***

This section includes the results obtained from the analysis of the kindergarten children's eco-management and persuasion behaviors related to recycling and composting after the six-week 3R implementation. In addition, the behaviors are investigated with reference to the school and home environments and they are corroborated through the parent and teacher interviews.

##### ***4.1.2.1.1 The kindergarten children's perceptions of recycling.***

With respect to recycling at school, all children said they recycled. Furthermore, changes in the children's recycling behavior were also verified by the teacher's explanations. The teacher stated that she observed favorable behavioral changes in all the children's behaviors as follows:

... I observe the same behavior in all of the children in different situations. For example, when one sees that his/her classmates have mistakenly disposed of recyclable materials into the garbage bin, s/he immediately warns them. Before the [3R] implementation, they had inadequate knowledge about recycling and had no chance to apply such knowledge [in their daily life]. Now, all of them [the children] have started to recycle at school. They separate garbage and recyclable items...They dispose of recyclable materials in their appropriate places, such as paper into the paper recycle bin, plastic into the plastic recycle bin, glass into the glass recycle bin and metal into the metal recycle bin . They are more careful in disposing recyclables in the recycle bin and non-recyclables in the garbage during snack time. I like observing such changes in their behaviors. For instance, they dispose of their milk cartons in the box labeled as 'paper' and their straws into the box labeled as 'plastic' recycle bins. In addition, when they had problems in finding the right bin, they asked for my help.

She also stated that:

As you know in May, there is a campaign relating to *school milk* initiated by the government. We were currently in the first week of this campaign...I called a student from a higher grade and gave milk to him to drink, and told him to put the milk carton and straw into a separate plastic bag after he drank the milk. However, he mistakenly threw both the milk carton and its straw into the same plastic bag! When the children in my class noticed that, they got angry and warned

him to take out the straw from the milk carton and put it into the bin for plastic items.

In the light of these findings, it can be seen that all children developed both eco-management and persuasion behavior related to recycling.

In the following section, the findings related to the home environment are presented, beginning with those based on the interviews with the children and moves onto those based on the interviews with parents.

At the outset of the 3R implementation, fourteen children stated that they had started recycling at home while five stated that they did not. In addition, two children claimed that they did not recycle but did reuse (see 4.1.2.3 for detailed information). Three children alleged that they did not recycle but intended to do so. The parents' responses also supported their children's behavior concerning recycling at home. The majority of parents (n=21) claimed that they observed changes in their child's behavior after the implementation. Three parents whose children did not recycle confirmed that their children had the desire to recycle. With respect to persuasion behavior, the analysis of the parent interviews indicated that except for three children, the remainder expended effort to persuade their parents, siblings and others (such as relatives, neighbors and peers) to recycle (See Table 4.1 p.147). It was determined that the children used different methods in persuading their parents and/or their siblings and/ or other people. For example, 19 out of 21 children attempted to persuade their parents, their siblings and other people by giving them information. Furthermore, 18 children convinced them pictorially (such as showing the recycling symbol) and 16 children tried to persuade others by giving examples (such as the places for the disposal of waste and garbage). The remaining responses are arranged in order of frequency: 11 children used the method of guiding, eight children used warning, four children shared their experiences, four children demanded, three children reminded, and two children used encouragement.

Extracts from the parents' responses regarding the changes in their children's behaviors and their efforts to persuade their parents, siblings, relatives, and peers after the implementation are presented below:

My daughter has constructed a recycle bin for herself. She puts all recyclable items into it [recycle bin] and also guides us [her sister, her father and I] to put the recyclables into this bin. When she sees that we put something into the garbage bin, she gets angry, asks why we put it there, takes it out of the garbage bin and puts it into the recycle bin. ...She warns us and her friends [not to forget to put things into the recycle bin]. When her friends come to our home, she shows them the recycling symbol and explains how to recycle. For example, she constructs colorful recycle bins for each packaging waste, namely; paper, plastic, glass and metal. When her friends come over, she tells them which materials should be disposed into which bin... (P, 1). (*guiding, warning, demonstrating, leading*)

...He went on a field trip to METU. He is very pleased to join this trip and began to recycle. He is aware of where and how to throw garbage and waste and the benefits of recycling. Moreover, he started to talk about these experiences...(P,2) (*sharing experiences, informing*)

When my son saw me disposing of something [waste] in the garbage bin, he said we have to dispose them [garbage and waste] separately. He tells me to put batteries into a separate bag...He says, 'This is paper, we should dispose of it separately.'... Recycling has become part of his life (P, 5). (*warning, guiding demonstrating*)

...Before the implementation, recycling was something that only I did. I warned people about doing recycling. Now, my son warns us. This is a positive change...He talks about recycling not only at home but also to his grandmother and aunt. He tells them to put paper and batteries into a separate place from the garbage. He tells them to separate all the waste from the garbage. Unbelievably, he tries to explain to his brother everything about recycling to him. Sometimes, I forget and throw the chocolate packaging [in the garbage bin]. He says to me, 'let's check whether there is a recycle symbol on chocolate package ...'(P, 11). (*warning, informing, reminding, demonstrating*)

...Before the [3R] implementation she did not know the recycling symbol and the meaning of three arrows of it [the symbol] in detail but she has started to pay much more attention. When something [such as plastic bottle that has been emptied, boxes containing cereal etc] is finished, she immediately looks for the symbol. She says, 'Let's get a plastic bag for packaging waste.' We try to recycle...She is more interested [in it] than we are, and she encourages us to recycle" (P,16). (*demonstrating, guiding, encouraging*)

...My son has started to participate in the process of recycling. He warns and says to me, 'let's do it [separate recyclables and non-



recyclables] when he sees something [waste packaging], even was smallest items mistakenly disposed of in the garbage bin. He talks about which one [the type of packaging waste] belongs to which bin. He has started to inspect items when we are shopping. If the box of the items can be recycled he tells me that we dispose of it [the box] in the recycle bin. He follows the recycling process [for purchased material] from the beginning to the end. Whenever he sees things that have been disposed of incorrectly, he warns me. I sometimes ignore this incorrect disposal and I wait until he warns me. He also explains recycling to my mother when I am at work. He always tells her about how to recycle and how we send things to the recycling center, and unless we do this, there will be garbage spread all over the place (P, 17). (*leading, guiding, demonstrating, informing, warning*)

...The effect of this [3R] implementation is clearly seen in my daughter's behavior...Sometimes when she sees something that has been mistakenly thrown into the garbage bin, she immediately gets angry and tells me to look for the recycling symbol. We look for the symbol and then we dispose of it into the appropriate place. She sometimes also warns her elder sister because when we dump out her [elder sister's] own garbage bin at her [elder sister] room she sees what was in the bin and tells her which things [packaging waste] she should not have thrown in the bin (P, 20). (*warning, demonstrating, leading*)

To sum up, the results concerning the home environment gave clues about how the majority of the children started to demonstrate eco-management and persuasion behaviors related to recycling at home.

#### ***4.1.2.1.2 The kindergarten children's perceptions of composting.***

The kindergarten children's eco-management and persuasion behaviors related to composting within both the school and home environments are reported in this sub-section. The findings are also corroborated by the responses of the parents and the teacher.

All the kindergarten children stated that they made compost from organic waste at school. Extracts from the children's explanations about composting at school are presented below:

Worms grow by eating the tree leaves that we throw to the aquarium [in the class]. The amount of leaves decreases gradually and then

compost is created. We go through the garden and we throw fruit peel; orange peel, apple peel and peppers, etc. Then we cover them with soil. In other words, we make compost...(C, 2).

We collect apple peel, eggshells, tea leaves, etc. in plastic bags. Then we compost in the garden and the aquarium. First, there is soil and then soil becomes darker gradually...(C,6).

You [the researcher] bring an aquarium and we put fruit peel into it so the worms are fed well. When they are fed they produce small young worms and then compost is formed there...(C,19).

First, we put the wooden crates. After that we dispose of the peel and leaves. Then, we cover them with soil. Afterwards, we again put peel and leaves in the crate and cover them with soil. When we throw soil we find worms [in the soil] and we gently place them there. We also add some leaves. Finally, we cover them with soil again and our work is complete. We occasionally mix it [compost]. We also make compost inside the classroom as we make at the garden... (C, 21).

The teacher's explanation about the children's behavior with regard to composting at school also supported the children's responses:

... In fact, when we collect fruit peel to make compost, they [my students] tell each other every time not to dispose of organic waste in the garbage bin. When we go to the garden, first we check the composting area, and they observe and follow the changes in the compost inquisitively...They also observe and follow the changes in the compost in the aquarium in the classroom every week, especially how the worms grow and reproduce.

In conclusion, as a result of the analysis of the responses from the children and their teacher, it can be asserted that all the children had gained eco-management and persuasion behavior related to composting at school.

The findings relating to composting at home revealed that only four children of 24 made compost at home. For instance one of them stated that "*We gathered them [organic waste at the photographs] in a plastic bag. Then we bury them in the garden. Thus, they are converted into compost...*"(G,20). However, one child throwing organic waste into the dustbin indicated his intention to start composting by saying "*We sort it [organic waste]. If the leftovers such as a piece of apple or*

*orange that we have not eaten are still edible we put them into the refrigerator if not we throw them in the garbage bin. However, I will tell my mother not to dispose of them [non consumable leftovers] in the garbage bin because we can make compost from them” (C, 11). Another child explained that they threw organic waste into the dustbin at home even though they made compost in the village. She said, “We dispose of it [organic waste] into the garbage bin. However, in the village we go to the field and plant the seeds of them, for example, cherry seeds then, the seed becomes a cherry tree. We also make compost from fruit peel. First, we dig the ground and throw them in there and then cover them with soil ...” (C, 12).*

However, 19 children threw organic waste into the dustbin.

The parents’ interview responses supported their children’s explanations regarding composting at home. The sample excerpts given below describe their child’s attitude to composting:

...Throughout the period of composting at school, we [my son and I] also tried to make compost in the basin at home. However, it takes a long time to convert organic waste to the compost and thus unfortunately we cannot make compost with all the organic waste ... (P, 5).

There is a tremendous change in my child... Unfortunately, we cannot make compost because of the lack of garden. Yet, my daughter plants fruit seeds in a pot to grow into a tree. What’s more, she tells me to collect fruit peel so she can give it to the worms at school for composting ... (P, 9).

... When we [my daughter and I] were at our shop last weekend I peeled some fruit. Then, she and her friend took the peel and dug a hole in the open ground [near the shop] and buried them. Then they came back to and told me that we should make compost (P, 16).

The analysis of the data gathered from both children and parents indicated that the majority of the children did not make compost at home.

#### ***4.1.2.2 The kindergarten children's perceptions of reduce/ reducing resource consumption.***

This section offers an analysis of the kindergarten children's eco-management and persuasion behaviors relating to reduce/ reducing consumption after the six-week 3R implementation. These findings are also compared with those obtained from the parents and the teacher.

The children's responses revealed that five of the 24 children, chose to reduce their consumption. For instance, a child (11) stated, "*We should not buy so much things. We should buy things [such as food, milk, etc.] that we can consume...*" Another child (19) further asserted, "*...We should not wipe our hands with napkins and wet wipes so frequently. In this way, garbage will not accumulate...*" Another student (C, 20) mentioned that, "*We should use fewer napkins. In other words, we should use things that will make less garbage and then fewer things will need to be recycled because too much waste will increase the damage to the environment...*"

The teacher's response to the topic of reducing resource consumption also supported the children's responses:

... They [my students] have started to become conscious about using less of both recyclables and non-recyclables. For example, they started to use less paper, packaging tape and glue while doing art activities.

Examples of the parents' responses presented below corroborate those of the children about reducing consumption:

...We [my children and I] have given up using plastic bottles after participating in the implementation. We have started carrying thermoses or flasks instead of plastic bottles. There has been a great decrease in our plastic waste consumption. I tried [unsuccessfully] to explain this issue to them [my son and his elder sister] before. But this implementation has had a tremendous effect on my sons' behavior. Now, they use thermoses voluntarily. This is great! (P, 17).

My daughter now has become conscious consumer...She has started to try to use less wet wipes and napkins... (P, 20).

Thus, it can be concluded that some children appeared to gain habit of reducing their consumption within both the school and home environments.

#### ***4.1.2.3 The kindergarten children's perceptions of reuse.***

This section presents findings regarding the kindergarten children's eco-management and persuasion behaviors relating to reuse after the six-week 3R implementation.

Findings have indicated that five children out of 24 start reusing the items they have bought. For instance, one child (17) explained, *"For example we [my sibling and I] can construct different toys from waste. We can give this waste to my mother and she washes it for reuse..."* Another child (9) stated, *"...I reuse it [waste]. For instance, I make binoculars from toilet paper rolls..."* Another child claimed: *"... I grow strawberries at home. First, my mother finds a big plastic bottle. We cut the upper part of the bottle and fill it with soil. Then, we buy strawberry seeds and plant them in the soil..."* (C, 20).

Furthermore, the teacher's response regarding their reducing behavior at school verified the children's statements:

... They [my students] have also started to use waste materials for activities; especially during art activities...they also reuse the bottles and containers in which they bring their meal or beverage [to school].

Samples of the extracts from the parents' responses also confirmed the children of the children towards 'reuse in the home environment:

When my son sees me while discarding plastic bottles, he says, 'Let's reuse it instead of putting it in the garbage bin'. He warns me not to dispose of them. We, then, fill the bottle with water and he puts it in his school bag to drink at school (P, 3).

...My son reuses things; he makes crafts. For instance, he uses plastic bottle caps to make model traffic lights... He uses empty cardboard toilet paper rolls given by his grandmother to build a water pipe model. He also tells me that we can reuse things such as glass bottles (P, 5).

There is a positive change in my son. For instance, he starts to separate waste paper [from the rest of the garbage] and use it to make various things like planes ... (P, 6).

Overall the analyses of the findings revealed that after the 3R implementation that a positive change occurred in the children's eco-management and persuasion behaviors concerned with the 3Rs and composting within both the school and home environments. The following section reports on the alteration in the predictors of children's eco-management and persuasion behaviors.

#### **4.2 Precursors of Children's Behavior regarding the 3R Implementation**

This section presents findings related to children's responses to the second research question; "How does the influence of the 3R implementation on precursors of kindergarten children's behaviors in relation to the 3Rs differ within the home and school environments?" This research question was addressed by these two sub-questions: a) "To what extent does the 3R implementation influence the precursors of eco-management behaviors exhibited by kindergarten children within both home and school environments?" b) "To what extent does the 3R implementation influence the precursors of persuasion behaviors exhibited by the kindergarten children within both the home and school environments?"

The findings regarding the change in the precursors of the children's eco-management and persuasion behaviors related to the 3Rs are presented in two parts. First, referring to the pre-implementation phase includes the analysis of the precursors of the eco-management and persuasion behaviors exhibited by the kindergarten children within both the school and home environments before the intervention. The second part, reports on the post-implementation phase, involving an examination of the changes in the precursors of eco-management and persuasion behaviors exhibited by the kindergarten children within both the school and home environments after the intervention (See Figure 4.2).

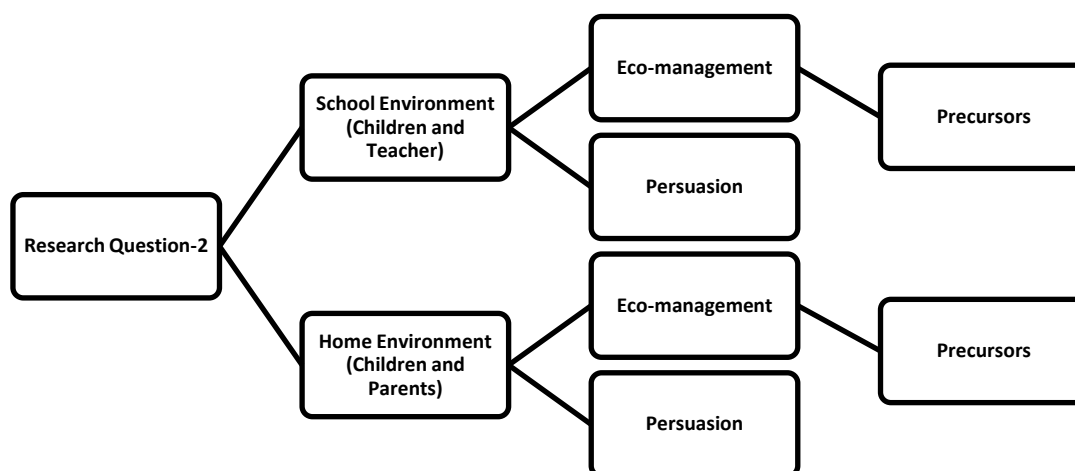


Figure 4.2 Diagram the process of determining the precursors of the eco-management and persuasion behaviors exhibited by the kindergarten children at home and school.

#### 4.2.1 Findings from the Pre-Implementation Phase

In this part the findings about ‘Recycling and Composting’, ‘Reduce/ Reduce Consumption’ and ‘Reuse’ are presented pertaining to the school and home environments. The results concerning the school environment are presented first from the children then from their teacher. The results regarding the home environment are presented similarly from children followed by the parents.

##### *4.2.1.1 The precursors of recycling and composting behaviors exhibited by the kindergarten children.*

In this section the precursors of eco-management and persuasion behaviors of the children towards recycling and composting are examined separately.

##### *4.2.1.1.1 The precursors of recycling behaviors exhibited by the children.*

Before the implementation, those children who did or did not recycle in the school environment referred to similar precursors related to their behaviors.

Eleven children who recycled mentioned various precursors which were: ‘environmental consequence as a part of personal investment’ (n=2), ‘social pressure as a part of situational factor’ (n=2) and ‘environmental knowledge’ (n=1). For instance, a child who addressed the environmental consequences said, “...*in this way our school is not polluted [keep clean]*” (C, 17). On the other hand, a child who identified social pressure stated that they recycled because their teacher wanted them to do it. Moreover, a child who described environmental knowledge as a precursor asserted that she recycled because waste polluted the environment and consisted of useless materials such as refurb plastic bottles and wipe wipes and thus, it should be put into the garbage bin

Of the thirteen children who did not recycle the precursors were; ‘social pressure, as a part of situational factor’ (n=8), ‘environmental knowledge’ (n=3) and ‘attitude, as part of personality factors’ (n=2). For example, a child for whom the reason was social pressure said, “...*They [the teacher and assistant teacher] do not allow us to recycle because we are too young*” (C, 24). One of the children for whom ‘environmental knowledge’ was a precursor, stated that s/he did not recycle “...*because I do not know how to recycle*” (C, 1). Another child whose precursor was ‘attitude’ asserted, “...*because there is a lot of work to do at school [I do not have enough time to be interested in recycling at school]*”(C, 18).

In addition, when the teacher was asked to describe the precursors related to children’s recycling behaviors before the implementation, she only mentioned environmental knowledge as follows:

Before the [3R] implementation, the children were also instructed about the recycling symbol as well. However, they have insufficient knowledge about how to do 3Rs and composting. Therefore, they did not involve in any application about 3Rs as well as composting.

Overall, the findings revealed that there were several precursors such as environmental knowledge, situational factors and environmental attitude related to doing and not doing recycling within the school environment. The



following sections focus on the precursors of children's behavior related to recycling and not recycling within the home environment.

The children who did or did not recycle provided distinct precursors regarding their behaviors. Firstly, the precursors concerning recycling, and then, those of not recycling are presented.

For 11 children were identified as have recycling precursors related to 'environmental consequence as a part of personal investment' (n=3) and 'environmental knowledge' (n=2) as precursors. However, the responses from 6 children did not conform to any of the categories given above and were thus labeled as an 'irrelevant response'. For instance, a child who was identified as having a precursor of an environmental consequence said, "...because our house is not polluted" (C, 17). Additionally, for the child with the precursor of environmental knowledge responded, "...so they [waste] can be taken away by the recycling truck" (C, 3).

As far as precursors of not recycling are concerned, four different precursors were identified from the responses of 13 children. These were: 'lack of facilities as a part of situational factors' (n=5) 'environmental knowledge' (n=3), 'attitude as part of personality factors' (n=2), 'internal locus of control as part of personality factors' (n=1) and 'irrelevant responses' (n=2). For example, the child who declared that there was a lack of facilities for not doing recycling asserted, "...because we do not have a recycle bin at home" (C, 8). Furthermore, the child whose response was based on environmental knowledge stated "...because I do not know how to recycle" (C, 1). Moreover, the child whose precursor was their attitude showed this in these words: "...because I have not thought about it [recycling]" (C, 11). In addition, a child whose precursor was internal locus of control stated, "... I have not mentioned it [recycling] to my mother and father but I have to. If I tell them, I would recycle..." (C, 5).

The analysis of the parents' interviews revealed that none of the children actively recycled at home. Only one parent with twins stated that her children tried to persuade her to do recycling at home (For detailed information see 4.1.1.1).

To sum up, within both school and home environments, different precursors related to recycling or not recycling emerged.

Since environmental knowledge emerged as common and important precursor of eco-management and persuasion behaviors the children were asked comprehensive questions in an attempt to obtain further information about their environmental knowledge. This allowed us to undertake a better analysis and obtain a clearer picture of the children's environmental knowledge. These questions mainly covered the current environment, environmental pollution, garbage, recycling and waste packaging.

In the following section, the children's views concerning the 'environment', 'current environment', 'environmental pollution', 'garbage', 'recycling and packaging waste' are presented.

*Environment.* Children's responses to the question pertaining to their perceptions of the environment revealed that 14 out of 24 children defined the environment as 'a place where living things live'. They used the terms like 'living place/environment (habitat)' (n=5), 'Earth' (n=3), 'nature' (n=3) and 'garden' (n=3) while explaining the environment. On the other hand, ten children gave irrelevant responses. The children's explanations related to environment included 'biotic components (animal, plant and human)' (n=21). In addition, the biotic components identified by children were 'plant (such as trees, grass, water)' (n=13), 'animal (such as parrots, fish, ladybirds, bees, wolves, dogs, cats and birds)' (n=13) and 'human beings (such as children, book sellers, music makers and neighbors)' (n=9). Moreover, the children's explanation related to environment contained 'human-made things (such as pools, garbage trucks, garbage bins, TV, books, roads and cars)' (n=19) together with 'abiotic components (such as the sun, moon, sky, clouds, soil and sand)' (n=8).

Given below are sample extracts from the kindergarten children's descriptions of the environment:

Our Earth forms the environment, it is a place in which we can live. There are trees, flowers, sun, sky, clouds, everything in the environment (C, 1).

... space comes to my mind...There are people living in different countries...(C, 4).

This [environment] is the forest...unpolluted places come to my mind... When I look outside, I usually see the road, cars and several houses (C, 20).

*Current environment.* The children's responses to the question regarding their perceptions of the current environment revealed that in general, all the children (n=24) mentioned 'human-made things (such as houses)' in their explanations, and the majority (n=19) included both 'biotic' and 'abiotic components (such as sun, sky, clouds and mountains)' when describing the environment in which they were living. Twenty-two children also referred to 'biotic components' in their definition. In particular, the biotic component was made up of 'plants (such as flowers, trees, grass, hazelnuts, etc.)' (n=19), 'animals (such as squirrels, cats, dogs, etc.)' (n=13), and 'human beings (him/herself, siblings, neighbors, etc.)' (n=14).

The kindergarten children's related explanations of the environment where they currently live were:

We have two gardens. One in front of our house and the other at the back of our house. We can plant flowers. There are sometimes squirrels... Squirrels can also play in the snow. We sometimes feed them with hazelnuts and peanuts ... (C, 21).

... There is a cherry tree. However, there are no cherries on it at the moment, they will ripen when the weather warms up ...We throw snowballs at each other outside during [winter] holidays. We [my friends and I] make a snowman ... (C, 12).

*Environmental pollution.* The analysis of the children's descriptions relating to environmental pollution demonstrated that majority (17 out of 24) described environmental pollution as 'garbage'. For instance, one of them said, "the garbage

*and a garbage truck come to my mind [when I hear the words 'environmental pollution']" (C, 7). 10 children defined environmental pollution as 'mucky'. For example, one child commented, "[When I hear about environmental pollution] Dog feces [comes to mind]. There is environmental pollution around my grandmother's house. There are lots of dog feces and mud..." (C, 9). One child said, "... [When I hear about environmental pollution] I think about calling the garbage collector... In addition, I think that I mustn't step on garbage and mud because if we step on these things we can slip" (C, 6). Another stated, "[When I hear about environmental pollution], I think about 'keeping our environment clean' ..." (C, 20).*

Moreover, when children explained the reason for environmental pollution, eight of them mentioned 'non-environmentally friendly behaviors' and eight children stated 'non-environmentally friendly behaviors' as well as 'garbage'. For instance, C (21) gave 'non-environmentally friendly behaviors' as the reason for environmental pollution saying: *"Even if there is a recycle bin, people do not put a box [packaging] into the recycle bin they throw it on the ground. Therefore, the environment is polluted."* The response of C (2) could be identified as both 'non-environmentally friendly behaviors' and 'garbage' as shown in these statements: *"Environments become dirty when everybody throws things on the ground. For example, we eat chocolate [and throw the wrapper on the ground] this is how we pollute [a place] in this way. When garbage is tossed away like that it spreads all over the ground. Our environment gets polluted in this way."*

Additionally, three children gave others reasons for environmental pollution (these responses did not conform to any of the above-mentioned categories and so they were labeled 'others'). To illustrate this, for example one of the children said, *"Our environment is polluted with mud. When we throw a banana skin [on the ground] and the tree's leaves fall, it [environment] becomes polluted"*(C,18). Moreover, four children cited 'garbage', 'non-environmentally friendly behaviors' and 'other' as the causes of environmental pollution. For example, one child uttered, *"In my opinion, every living thing can pollute the environment ... of course, people too. For example, after drinking my juice, instead of throwing it in the garbage bin I*

*can throw it on the ground. Moreover, birds can poop. Trees drop their dry leaves which are garbage. For example, insects spread dirt...*” (C, 9).

*Garbage.* An examination of the interview responses indicated that garbage was understood by children as items which are ‘useless’, ‘disposed into the dustbin’, ‘disposed outside/ground’, ‘dead’ and ‘mucky’.

Three out of 24 children only called garbage ‘useless’. For instance, one child stated, *“For example, when computers become out of date and we disposed of them. Necklaces and paper is crinkled, and thus, they are thrown from the window...”*(C, 14). In addition, four children named only ‘disposed into dustbin’. For instance, a child asserted, *“...Garbage is everything, the waste that we dispose of in the garbage bin. The fruit juice carton, plastic cans, paper, iron, are garbage waste”* (C, 12). Furthermore, one of the children mentioned two terms, ‘useless’ and ‘mucky’, when explaining what garbage was, *“empty coco-cola cans, useless paper, dust and mud are garbage”* (C, 8). Four children used three terms. For example, one child explained that garbage was ‘useless’, ‘disposed outside/ground’ and ‘dead’ in his following utterance: *“One day, the books [in the school library] will be garbage because they will have used many times and will be worn out and finally will become garbage ... In my opinion, everything found in nature can be garbage ... [human beings] themselves will be garbage. When we die, I think we also will be recycled”* (C, 9).

In this sub-section related to the properties of garbage such as whether it was recyclable, five out of 24 children considered garbage to be recyclable whereas six thought it was non-recyclable. Half the children (n=12) perceived that some garbage was recyclable and one child did not know whether garbage was recyclable.

The results also revealed that the children who said some garbage was non-recyclable (n=18) gave different explanations about the process that non-recyclables are exposed to. Six children said they were generally unaware of what happened to the non-recyclables. Moreover, another six children thought garbage was something to be taken to a refuse dump or garbage disposal place. Four children believed it

remained in the place where it was left, two thought that it was burnt (n=2) and one stated that it was taken far away (n=1).

Some of the kindergarten children's responses relating to their perceptions of the properties of garbage are presented below:

No [garbage is not recycled]. When you throw it [garbage] into the garbage bin it is gone but I do not know where it goes (C, 18).

No [garbage is not recycled] but some garbage is recycled. Non-recyclables are dumped in landfills or transported to an abandoned area (C, 1).

Yes [garbage is recycled]. Glass is recycled. Of course! Mucky [things] is not recycled. Things that are not recycled are thrown into the garbage bin and then burned (C, 5).

The following sub-section is related to the precursors of disposing of garbage into the garbage bin. Although all the children put garbage in the bin, there were different explanations for the precursors of their behavior. A total of 16 children out of 24 referred to 'personal investment' as a precursor for garbage disposal. Thirteen children gave responses that indicated 'personal investment–environmental consequences'. For example, one stated, *"Of course [I dispose of garbage] in the garbage bin to prevent environmental pollution [to keep environment clean]"* (C, 18). In addition, for three children 'personal investment–economic consequences' was the precursor for the disposing of garbage. For instance, a child commented, *"I dispose of it [garbage] in the garbage bin because it is taken by a dustman. The dustmen can make something thing [from it] that they need ..."* (C, 8). Three children described 'environmental knowledge' as a precursor for disposing garbage. To illustrate, one said, *"I dispose of it [garbage] in the garbage bin because it is contaminated. When things are polluted they become garbage"* (C, 6). Another child said, *"I dispose of garbage in the garbage bin because I am a nice person and thus I throw into the garbage bin"* (C, 7) thus having a 'personal responsibility' as a precursor for disposing of garbage. Moreover, the responses of two children affirmed that 'social pressure as part of situational factors' was a precursor for their attitude to the disposal of garbage. One of these children stated, *"I do this [putting garbage into*

*the bin] because my mother does it*” (C, 23). Additionally, a child presented an ‘environmental attitude’ as a precursor for disposing of garbage with this expression: “...*Sometimes I feel bad about throwing it [garbage] on the street...*” (C, 9). Lastly, one child’s precursor for disposing garbage was not related to any of the codes listed above. The child explained reasons thus; “*I dispose of it [garbage] in the garbage bin because unless we dispose of it in the garbage bin, places will be messy and crowded and we could fall down*” (C, 15).

Regarding behavior within the home environment, in the responses of 11 of the 24 children the precursor for disposing of garbage was for ‘personal investment–environmental consequences’. For instance, one of them said, “*I dispose of it [garbage] in the garbage bin because if our house is polluted the air is also polluted and thus smells worse and sometimes we become ill*” (C, 1). Furthermore, for one child the precursor was ‘personal investment–economic consequences’ seen in the following words: “*I do something with it [garbage] and thus there is no need to dispose of it in the garbage bin. Torn paper. When paper is torn I make something like a helicopter, plane, frog ... Therefore, we have lots of things ...*” (C, 10). In addition, ‘environmental knowledge’ was a precursor for disposing of garbage for two children with one of them remarking, “*I dispose of some of it [garbage] in the garbage bin. However, we collect plastic bottle caps and take them somewhere [to the factory] ...*” (C, 5). Furthermore, for three children the precursor was ‘environmental knowledge’ one explained, “*I put it [garbage] into the garbage bin because it is dirty. If it is not dirty, I put it with my toys*” (C, 19). Moreover, one child “*I dispose of it [garbage] into the garbage bin because I am in the habit of disposing it there*” (C, 9) thus, demonstrating that ‘habit’ was the precursor. Another precursor for the disposal of garbage for three children was ‘social pressure as a part of situational factors’. One of them asserted, “*I do this [disposing of garbage in the garbage bin] because garbage should be thrown into the garbage [bin]*” (C, 2).

Regarding behavior within the school environment, for 15 out of 24 children the precursor for disposing of garbage was ‘personal investment–environmental consequences’. For instance, one of them stated, “*We dispose of it [garbage] in the*

*garbage bin...For example, I glue paper together because when paper is torn it has no properties and the trees are cut down unnecessarily.*" (C, 21) Moreover, in the responses of three children 'social pressure as a part of situational factors' was found to be a precursor for disposing of garbage. To illustrate one of them responded, "*I always dispose of it [garbage] in the garbage bin because there is a rule related to this [throw your garbage into the garbage bin]*" (C, 10). Additionally, 'environmental knowledge' as a precursor for disposing of garbage for three children one of which said, "*Generally, I do not bring any cloth to put on the table at eating time like everybody else. Instead, I bring a paper napkin then I throw my napkin together with my other garbage into the garbage bin after eating time because it is waste ...*" (C, 9).

In this sub-section, concerning advice on reduce/ reducing consumption, 11 out of the 24 children suggested 'disposing garbage in the dustbin/refuse lorry/garbage bag/dumping ground' as a way to reduce garbage, and seven suggested 'recycling'. One child proposed 'reducing consumption'; another child advised 'reusing resources' and four children's made suggestions that differed from those of the others in this group.

For 11 children 'personal investment–environmental consequences' and for three more 'personal investment–economic consequences' was the rationale to explain their preference concerning the reduction of garbage. For four children 'environmental knowledge' was identified as the precursor for their preference. Six children's responses were 'irrelevant', meaning they were not related to the three items given above.

The extracts given below from the kindergarten children's responses show their suggestions and the related precursors for reducing garbage:

If we dispose of things that can be recycled in the garbage bin, the garbage is reduced....We do it this way so the surroundings will not be polluted ... (C, 17). (*environmental consequences*)

We should put things that we don't need into the garbage bin so the environment will not be polluted (C,4). (*environmental consequences*)



We should dispose of recyclables in the recycle bin because we can transform [this] garbage into useful things (C, 1). (*economic consequences*)

[We should] dispose of things in the recycle bin because when we put them in the recycle bin, the garbage truck comes and takes them... (C, 18). (*environmental knowledge*)

We should dispose of it [garbage] in the garbage truck because it gets taken to the place where garbage is found (C, 14). (*environmental knowledge*)

Garbage trucks come and take garbage to the place where it is burned and thus it is reduced. We buy garbage bins and burn garbage so that it does not overflow (C, 21). (*other-irrelevant*)

*Recycling and Packaging Waste.* In this section, children were asked whether they had seen the recycling symbol before the implementation. Nineteen of the 24 children were able to recognize the symbol but the remainder could not. However, the children who said they recognized the symbol gave various responses as to its meaning. Only six of those who recognized the symbol identified it as a ‘recycling symbol’, while four children stated, ‘I do not know [what it means]’. Seven children said it means ‘dispose of recyclable things in this [place/bin]...’, and two children said that they were ‘not sure’. Six of those who recognized the symbol identified the place where the symbol can be found as ‘on a recycling bin’, three children said ‘I do not know’. A further three said it could be found ‘on a dustbin’ with four children saying ‘at school’ and finally six children’s responses were categorized as ‘other’.

Sample extracts from the kindergarten children’s responses concerning the recycling symbol are presented below:

It [the recycling symbol] is on the recycling system box. It means put things that are recyclable into it [the box] (C, 1).

My mother points it [the recycling symbol] out in places. I do not know what it means (C, 2).

I see it [the recycling symbol] in some places. I do not remember where I have seen it. The sign means that we can recycle (C, 6).

It [the recycling symbol] is on bottles, bottle caps and plastic toys. It means the symbol of recycling (C, 5).

I saw it [the recycling symbol] in the book when the teacher was teaching us. It means recycle bin (C, 12).

In addition, the analysis of the interviews revealed that in the photographs (see Appendix A) shown to them 10 children were able to identify four different kinds of recyclable waste, namely paper, plastic, glass and metal, five could name all of them except metal, one child could name all but plastic, six could name paper and glass, and two children were only able to name paper.

Although 16 out of 24 children described paper as recyclable, only half (n=8) could give examples of what kinds of materials paper was converted into; the other half (n=8) did not know. Three of the children were not sure whether paper was recyclable and five believed that paper was not recyclable.

Of the 24 children the majority of children (n=18) described plastic as recyclable, however, two-thirds (n=12) did not know what material plastic could be converted into. The remaining children (n=6) could provide examples. However, two children were not sure whether plastic was recyclable, and four children stated that plastic was not recyclable.

Even though more than half of the children (n=13) identified glass as recyclable, eight did not know what materials glass could be converted into. They were able to name examples of the materials that the recycled glass could be used for but were not sure. In addition, four children were not sure whether glass was recyclable, and seven children believed that glass was not recyclable.

More than half (n=16) of the 24 children identified metal as recyclable, though the majority (n=13) did not know what products recycled metal could be used for. Three were able to provide examples, although one child was not sure. In addition, three children were not sure whether metal was recyclable and five children stated that metal was not recyclable.

Sample extracts from the kindergarten children's responses in terms of the recognition of recyclable materials and the processes of recycling paper, plastic, glass and metal are as follows:

These [photographs of items he was asked to identify] are made up of paper, plastic, glass and metal. All of them are [can be] recycled. Paper is recycled into pictures and plastics are recycled into toys. I do not know what material glass is recycled into. Metals are recycled into robots (C, 3).

These [photographs of items he was asked to identify] are made up of paper, plastic, glass and iron. All of them are [can be] recycled. Paper is recycled into its former shape. I do not know which material plastics and metals are recycled into. Glass is combined again, or water is put into it or something is put into it (C, 5).

These [photographs of items she was asked to identify] are made up of paper, plastic, glass and metal. All of them are [can be] recycled. Paper is recycled into books, plastic is recycled into plastic again. Glass is recycled into dishes and shelves that are made of glass...I do not know which material metals are recycled into (C, 9).

These [photographs of items she was asked to identify] are made up of paper, plastic, glass and iron. Paper is not recycled. Plastic and glass are recycled. Metals may be crushed, the teacher hasn't taught that yet (C, 12).

These [photographs of items he was asked to identify] are made up of paper, plastic, glass and metal. Paper, plastic and metal are [can be] recycled. Paper is recycled into planes. Plastics are recycled into circles like the things that appear from Danone [yoghurt production company]. Metals are recycled into table legs (C, 14).

In this sub-section on the handling of packaging waste, when children were asked the question "what should be done to recycle packaging waste?", nine out of 24 children said it should be put into the recycle bin. As one of them stated, "*We should dispose of it [packing waste] into the recycle bin*" (C, 8). In addition, three said it should be put in the recycle garbage bin [confusing recycle bin and garbage bin]. For example, one of them stated that, "*We should dispose of it [packing waste] in the recycle garbage bin*" (C, 2). Furthermore, two children said that things no longer of use should be put in the garbage bin and useful things put into the recycle bin. As one child said, "*We should dispose of some of it [packaging waste] in the*

*recycle bin and some of it that doesn't have a use into the garbage bin*" (C, 5). Furthermore, five children did not know what to do with recyclable waste one said, *"We should do something but I do not know. We have not learned it yet"* (C, 18). Lastly, the responses of five children were distinct from all of the responses. For example, one of them stated, *"We should tell someone to recycle these. If they know they can recycle them. For example, we tell the stationer [stationery shop person], the glazer"* (C, 16).

In this sub-section, an analysis is given of the responses that the children gave to the following questions: "Where is the nearest recycle bin in your school? Is there any recycling bin near to where you live?" One-third of the children (n=8) out of 24 perceived the recycle bin at school as a box used for gathering paper but gave no information about where the box could be found. Three of the children knew the exact location of the recycle bin at school and gave detailed information about it, such as which materials should be put into it. Five of them confused the recycle bin with the garbage bin, another five said they did not know, and three children said there was no recycle bin at school. In terms of their home environment, half of the students (n=12) out of 24 said there was no recycle bin in the vicinity. Although one-third of children (n=8) could describe the location of a recycle bin, there was some confusion with the dustbin since they were not sure which materials were thrown into it. Three of them were not sure whether there was a recycle bin nearby their home.

Some of the kindergarten children's responses to the question concerning the location of the recycling bin are as follows:

I have not seen it [a recycle bin] (C, 2).

There is a garbage bin but there is no recycling bin at school (C, 24).

In the garden. There is a recycle bin at the school exit. Plastics, glass, metals and paper are put there [in it] (C, 5).

Let's say it is a garbage bin. It is near the door and garbage is put into it, such as milk boxes, covers, broken toys and watches (C, 16).

There is no recycling bin there [in the child's home environment] (C,5).

There is a garbage bin. Here is our home and it is here [indicating a position nearby] (C, 14).

There is one next to our home. For example, we dispose of the mucky [things] in there that come from our garbage bin, glass and plastic caps, and put them outside (C, 23).

This sub-section presents the analysis of the children's responses to the question, "How is packaging waste recycled?" Half the 24 children (n=12) did not know how waste was recycled. Three of them said waste was recycled by putting it in the recycle bin. For instance, a child stated, "*It [packaging waste] is disposed of in a recycle bin. The recycling garbage truck takes it. Then they look at whether it is good or not, whether it is polluted or not. If it is not polluted they bring it, if it is polluted they leave it there. First, it is cleaned and after that, it is brought to the recycling bin*" (C, 7). In addition, one child said waste was recycled at a factory with these terms: "*When you dispose of it [packaging waste] into the recycle bin, recycling men take it and then they recycle it at the factories. After that, they give them back to the markets*" (C, 17). Moreover, three of them said items were recycled by gluing them back together. To illustrate, one of them explained, "*My uncle said we can do something without cutting the paper. Sometimes they tear plastics but I can glue them together. I apply glue like this, which means I stick it together and wait until tomorrow, and then I look at it tomorrow. Sometimes it holds milk. However, I always notice they do not tear plastics anymore, they have become wiser. We should throw glass into the recycle bin. We can glue it together that way*" (C, 21). Lastly, five of them responded with comments that differed from those of the other children. For instance, C (9) said, "*It [paper] is taken by truck and then is dumped into a garbage bin. Crushing, crushing, crushing like this [she uses her hands to demonstrate]. It is disposed in an enormous hole. Then the hole spins, spins, spins to make new goods. It is my favorite.*" C (15) also said, "*Suppose I take broken glass and put it here. Suppose you have been waiting for a very long time. It is recycled and then you use it.*"

The last question that the children were asked was “What will happen unless we do recycling?” Ten out of 24 children answered in ways indicating that not recycling resulted in ‘personal investment–environmental consequences’. For example, one of them stated, “*Our environment is very polluted and we can become ill from certain smells*” (C, 1). Additionally, four children referred to ‘personal investment–economic consequences’ as the consequences of not recycling. In the words of one child stated, “*We will not have anything such as books, planes, doors, shoes, masks and wigs*” (C, 14). However, two children did not know what would happen if we did not recycle. Lastly, some of the one-third of the responses that did not fall into any of the assigned codes are shown below:

If we do not, we will lose our way (C, 2).

We will not be able to do anything. When the surrounding areas are polluted we cannot clean these things (mud, tin, bottle caps) (C, 6).

We have to clean things that we make dirty and we are [will be] tired. [In order ]Not to be tired we should recycle (C, 7).

Things will go directly into the trash. They do not become anything else  
(C, 8).

#### ***4.2.1.1.2 The precursors of composting behaviors exhibited by the kindergarten children.***

This sub-section examines the precursors (e.g. environmental consequences as a part of personal investment and knowledge about compost) for the kindergarten children’s behaviors relating to composting only in the home environment. However, it is important to note that prior to the implementation in the current research the children had not received any input from the teacher at school about composting (See 4.2.2.1 for detailed information).

All but one of the children (n=23) said they disposed of organic waste in the garbage bin at home. This behavior can be explained as emanating from the following precursors: ‘environmental knowledge’, ‘personal investment–

environmental consequences' and 'other'. For one-third of the children (n=8) environmental consequences was the precursor relating to their disposing of organic waste in the garbage bin. Only four children used the 'environmental knowledge' precursor. The child who said that they made compost was citing the precursor of 'environmental consequences as a part of personal investment'. However, nearly half of the children (n=11) gave responses that did not correspond with any of the existing categories, and were recorded as 'other'.

In addition, the children's knowledge of compost as a precursor for behaviors related to composting was examined. The analysis revealed that all the kindergarten children except one (n=23) stated only what they saw in the photographs (See Appendix A). However, one child named items that could be used for composting. Therefore, all the other children had no knowledge about composting.

Below are extracts from the kindergarten children's explanations about what they do with organic waste at home:

We dispose of some of these [referring to the photographs] in the garbage bin. For example, pasta gets worse, which means it becomes moldy. We dispose of it in the garbage because moldy things cannot be eaten. We put apple waste in the garbage bin because the world may disappear (C,5). (*personal investment–environmental consequences*)

We put leftovers, orange peels and onions in the garbage bin because they are unnecessary things (C, 8). (*environmental knowledge*)

We cut out the rotten parts [referring to the photographs] and eat the other parts. We put the rotten parts into the recycling bin so something can be made from them. For example, a doll can be made from them [referring to the photographs] one that is very beautiful (C, 1). (*other*)

We put these things [referring to the photographs] into the garbage bin when they rot because if we eat rotten things we become ill (C, 11). (*other*)

We put apple waste in the garbage bin because we have to dispose of it, it can stick in our throat. We dispose of orange peels because if we do not, it becomes messy and we could fall (C, 15). (*other*)

My mother is teaching me to compost...When the apple peel becomes compost we put it [the compost] into buckets and give it to some flowers. The flowers can grow... (C, 20). (*personal investment–environmental consequences*)

In addition, analysis of the parents' interviews indicated that three children had knowledge of composting; however, only two of these children had experience in making compost. An extract from a parent's response shows how he/she explains composting at home to her daughter:

I inform her by explaining it [the process]. She is aware that when we throw it [organic waste] into the soil, it is converted into compost, which means she is aware that it is put into the soil. When I separate waste in the kitchen, I tell her why I do it. However, she has not actively participated in the process. I explain to her that this is useful for the soil and the living organisms in it; thus, instead of throwing it into the garbage bin we can convert it into something beneficial for the soil (P,21).

To conclude this section the children's environmental knowledge, which is one of the significant precursors of both eco-management and persuasion behaviors at school and home environments was examined. In the following section, the precursors related to children's behavior of reducing consumption are described.

#### ***4.2.1.2 The precursors of reduce/ reducing consumption behaviors exhibited by the kindergarten children.***

This section is allocated to the examination of the precursors of the behaviors relating to reduce/reducing consumption exhibited by kindergarten children.

The analyses of interviews indicated that only one of the 24 children stated that: "*We should not buy more food and drink ... so that nature is not polluted*" (G,9) this fits with the precursor of 'environmental consequence as a part of personal investment'.

However, the rest (n=23) did not choose 'reduce/reducing consumption'. In general, children disposed of things which were no longer of use into the garbage bin for the reason of 'environmental consequence as a part of personal investment'. For



instance, (C, 4) stated, “*We should throw the superfluities because the environment is not polluted.*”

Regarding children’s reducing behavior within both school and home environments no comments were made by the teacher and parents.

#### ***4.2.1.3 The precursors of reuse behaviors exhibited by the kindergarten children.***

This section reports on the investigation of the precursors of the behaviors related to reuse exhibited by the kindergarten children. In addition, these findings are validated by the responses of the teacher and parents.

The findings related to reuse indicated that three children preferred to reuse items for reasons of ‘personal investment–economic consequence’. Two of extracts from the kindergarten children’s explanations show the connection to this precursor of reuse:

...so the paper is not frittered away unnecessarily (C, 8).

...so the paper is not thrown away (C, 3).

The teacher and parents also stated that the children engaged in some activities and products related to reusing materials for the school’s exhibition and fashion show (for detailed information see 4.1.2.3).

#### **4.2.2 Findings from the Post-Implementation Phase**

This section consists of findings obtained from the kindergarten children, parents and the teacher under three headings, namely “Recycling and Composting”, “Reduce/Reducing Consumption” and “Reuse”. In each section, first, the findings pertaining to the school environment and then, those related to the home environment are given.

#### ***4.2.2.1 The precursors of the recycle and composting behaviors exhibited by the kindergarten children.***

This section present the results obtained from the analysis of the precursors of eco-management and persuasion behaviors related to recycling and composting exhibited by the kindergarten children in the school and home environments following the six-week 3R implementation. These findings are corroborated with data obtained from the parent and teacher interviews.

##### ***4.2.2.1.1 The precursors of recycle behaviors exhibited by the kindergarten children.***

Within the school environment, the explanations of 18 of the 24 children about recycling fell into the following precursor of ‘personal investment–environmental consequences’ (n=18). For instance, C (10) stated, “*Yes, I recycle very often. I put paper in the recycle bin for paper, plastics in the recycle bin for plastics, glass in the recycle bin for glass and metal in the recycle bin for metals so that they are recycled and the environment is not polluted.*” A further four children used the precursor of ‘personal investment–economic consequences’. For example, one child said, “*Yes, we do recycling altogether. I dispose of the recyclables into the recycle bins that we construct because they are recycled. The benefit of doing recycling is to produce something. When the bucket of milk is recycled we can take it. [I mean]We can use the recycled one. If we do not recycle we cannot find any milk bucket*” (C,6). Additionally, a child illustrated the precursor for recycling as ‘environmental knowledge’ in these terms: “*Yes. We dispose of recyclable things in the recycle bin that we built so they are recycled. Then we dispose of them in the recycle bin in the garden. Then the recycling trucks come and take them and recycle them over there*” (C, 4). Lastly, one child had ‘attitude as a part of personality factors’ as a precursor for recycling showed in the following sentence: “*Yes, I dispose of recyclables into the recycle bins in the classroom because I love recycling very much*” (C, 14).

The children's responses were confirmed by the teacher, who described the development of the children's environmental knowledge. In the extract below she uses general comments since she said she had observed the same environmental knowledge changes in all the children.

I showed [the children] the recycling symbol before the 3R implementation, but it didn't have as much of an effect as the 3R implementation itself. Afterwards, this became permanent knowledge for them. Their parents say the same thing and emphasize that their children gained an understanding of the symbol.

This is true of the whole class because you have to deal with them one by one. You [the researcher] have done activities such as drama. I cannot single out any one child because they all seem to be displaying the same behavior and level of knowledge. If you were to ask me one by one I would give you same answer for each of them because all the children are well informed, and have become more conscientious about recycling. We [teacher and families] support you [the researcher] both at school and at home...

In terms of the home environment, the children who recycled and those who intended to recycle (n=20) their behaviors were explained by 'personal investment-economic consequences', 'personal investment-environmental consequences' and 'environmental knowledge' precursors. The majority (n=17) of the 20 held the precursor of 'personal investment-environmental consequences' for doing recycling. For instance, C (1) stated, *"However, sometimes my father does not know about it [recycling]. I have told my father a hundred times. I have also told my mother a hundred times. I have told my sister a hundred times. I constructed a recycle bin made of cardboard for my sister, but she throws garbage in it. She puts napkins in it. I tell her to put recyclables there but she still puts garbage into it; my sister does not know [how to recycle] because she has not gone to kindergarten. If we do not separate garbage and waste, waste becomes and smells worse and also loses its properties so that it cannot be recycled properly even when it is not mixed with garbage"*. C (14) commented, *"I put recyclables into the recycle bin because other things are not recycled. In addition, waste is not mixed with garbage. If we do not recycle, we do not have anything. If there is nothing, we cannot do anything. For example, we cannot paint, read stories, construct anything from bottles made of*

glass. Because of this situation, we, animals, elephants, plants get damaged. Plants do not grow.” Furthermore, for two children ‘personal investment–economic consequences’ was their precursor for recycling. For example, one of them asserted, “Yes I do [recycling]. I accumulate the recyclables in one place. There is a recycle bin near us. I dispose of them in there. If I do not do this, there will be less glass and plastic ... in our world” (C, 21). One child stated: “I recycle but I have not started to do it yet because we have not found a plastic bag. However I will find a bag today and start so that when we can separate and dispose of things into the recycle bin, then the recycling truck comes and takes everything to the recycling center and they are recycled there” (C,6). This showed ‘environmental knowledge’ as a precursor for the intention to recycle.

Four of the 24 children did not recycle and their reasons can be categorized as ‘situational factors’. For instance, one of them stated, “No, because there is no recycle bin in our home” (C, 22). C (12) said, “... However, I do recycle when I go to my grandmother’s because there is a recycling bin. We should do it so our nature is not polluted.” In addition, the ‘lack of recycling habit’ was the precursor for not recycling C (24) responded, “No, because I am not in the habit of recycling.”

Moreover, children’s responses related to recycling within the home environment were supported by parents’ responses in terms of comparing the precursors of children’s eco-management and persuasion behaviors before and after the implementation. The analysis of parents’ replies indicated that there had been a change in all of the children’s environmental knowledge (See Table 4.1).

Table 4.1 shows the rest of the items arranged in frequency: 13 parents noted a change in their child’s environmental consciousness, four observed a change in his/her child’s environmental attitude, two noted a change in their child’s environmental awareness and one parent remarked that a change had taken place in his/her child’s environmental sensitivity.

Table 4.1

*Alteration in Children's Eco-management and Persuasion Behaviors and Their Precursors after the Implementation*

Codes	Frequency
environmental knowledge	24
recycling behavior	21
intention to recycle	2
environmental consciousness	10
persuasion of other people	21
environmental attitude	4
environmental awareness	2
environmental sensitivity	1

Below are sample extracts from the parents' explanations concerning the change in the precursors of their children's eco-management and persuasion behaviors after the implementation.

...My daughter examines the things we buy and looks for the recycling symbol on items such as ice cream containers, milk containers and anything else. When she sees the symbol, she immediately shows it to me. When she sees that it is a recycling symbol, she says 'let's dispose of it [packaging waste] in the recycle bin'. Before the implementation she was careful but now, since the implementation, there has been an obvious change in her. [Before] We would put it [packaging] in the garbage bin sometimes. I would separate packaging waste but it looked like she didn't pay attention to this process. However, after the implementation she started construct recycle bins... She also enjoyed the field trip and the [visit from] expert who came from ÇEVKO (P, 1).

There is a tremendous change in my child ... She also recognizes the recycling symbol ... She says to me, "You should not put this [packaging waste] here, and we should take it to the recycle bin." Moreover, she has become more conscious, interested and curious in relation to these subjects.

A few weeks ago, we went to my mother's home. When we went, I put the plastic bottles in the garbage bin because I had no time to search for a recycle bin. She got angry and told me not to dispose of such things there again and again. After picking up my mother we returned by the same route. When we passed the garbage bin where I had disposed of the bottles, she also complained about me to my mother and wanted to explain what I did (P, 9).

Now my son knows everything related to recycling in detail. He has started to talk about recycling the packaging of the chocolate that he eats, the lettuce that we wash at home, the peel from oranges that we squeeze and everything...This is a good change. He has become conscious about this subject... He recognizes the symbol when he sees it even if it is small (P, 11).

I observe that this implementation [the 3R implementation] has had a positive effect on my son. The most important change is that he has learned about the recycling symbol on the packaging of things we use... (P, 17).

...she also distinguishes between types of garbage very well. In fact, she distinguishes between them much better than I do. She definitely looks for the recycling symbol on things. She knows that non-recyclables such as wet wipes and napkins. I learned from my daughter that these should certainly be thrown in the garbage because they are not recycled under any circumstances. She has given me a lot when it comes to recycling...When things are recycled trees are not cut; these things are produced again and converted into different things. She is conscious of these... (P, 20).

Moreover, after the 3R implementation, the children's responses were examined in detail in terms of the same precursor, that of environmental knowledge, with respect to the environment, environmental pollution, garbage, recycling and packaging waste.

*Environment.* A great majority (n=19) of the 24 children perceived the environment as 'a place where living things live'. Nine considered it as not only 'a place where living things live' but also as a 'habitat'. Furthermore, 19 children's descriptions about the environment included 'biotic components (animals (such as birds), plants (such as trees, flowers and grass) and human beings (such as children)'. Biotic components were also comprised of 'plants and animals' (n=8) and 'plants, animals and humans' (n=10). Two children also described it as a place 'to raise a plant' as part of their explanations of the environment. Moreover, 19 children's explanation about environment contained 'human-made things (such as recyclables, recycle bins, garbage trucks, garbage bins, computers, white boards, shoes, paper, trousers, cars, etc.)'. According to the analysis of the children's responses regarding human-made

things, seven children used the terms, *garbage, recycling, garbage bins and recycling bins*. Furthermore, five children referred “abiotic components (such as sea, soil and mud)” while defining the environment.

Examples of kindergarten children’s descriptions about the environment are as follows:

The environment is the place outside our homes; in other words, everywhere that we live. For example, under the water that place is the environment for fishes. All living things have their own environment. For instance, the lions’ environment is the forest, the plants’ environment is everywhere (C, 9).

This [the environment] is a habitat. This is a habitat where animals, people, plants, flowers, trees and vegetables live. Of course, there is no habitat where vegetables live (C, 11).

It [the environment] means the whole world. Everything is the environment. For example, the place where the blowflies go is also an environment. The blowflies themselves are also an environment. Everybody is an environment (C, 4).

It [the environment] means neatness. In other words, the environment is a place we live in and reside. I see dirty things in my surroundings. There are plastic cups and straws. There is garbage in someone’s hand. There is a girl. There are children who are playing ball [in the environment]. There are balls, trees, houses and cars ... (C, 23).

It [the environment] is our nature ... the sea, the soil ... There are trees, animals, almond trees, people, sea, soil and toys [in the environment] (C,12).

Our environment is our world ... right now, in my surroundings there is a window, table, chair, bag and computer. Now we are in a classroom, which is similar to a library (C, 16).

*Current environment.* 23 of the 24 children perceived the current environment (where they live at present) as ‘a place where living things live’. The children described the current environment utilizing ‘biotic components [animals (such as worms, insects, cats, dogs, etc.), plants (such as flowers, grass, leaves, roses, tomatoes, etc.) and human beings (my parent, my friend, etc.)]’ (n=24), ‘human-made things (such as a pool, recyclables, recycle bins, garbage trucks, garbage bins,

bottles, cars, toys, etc.)' (n=24) and 'abiotic components (such as the sun, water, weather, wind, etc.)' (n=5). Biotic components were described as consisting of only 'plants and animals' (n=6), only 'human beings' (n=3), and 'plants and animals and human beings' (n=24). Furthermore, five children used the description of a place 'to raise a plant', three children said a place 'to feed animals' and three children mentioned 'compost' in their explanations of the current environment. Three children described human-made things with the examples, *garbage, recycling, garbage bins and recycling bins*.

The kindergarten children's perceptions of the current environment are presented below through extracts from their interview responses:

There is my smallish room in my home. Its color is rose pink. I walk around in my room ... My house has a garden. We found four-leaf clovers in the back garden ... Birds sometimes come to our garden. I feed them. Cats and dogs also come to our garden ... (C, 9).

I live with my sister in an apartment. I have a father but I do not see him. I only see him when I go to the store. We live on the third floor. My house has a garden ... There is a huge pine tree in our garden... (C, 16).

This [my environment] is our home. There is a ramp where a house is being constructed. Our house is four stories [high], but nobody lives on the fourth floor. There are a lot of toys in my room, such as dinosaurs, a remote-controlled car, etc. The outside of our house is decorated. My home is beautiful. The front of it is also wonderful. There are nice things on the wall. The house does not have a garden. There is a separate house opposite ours. It is grey at the front and yellow on the sides (C, 11).

... I plant tomatoes in our garden and I add compost to it [the garden]. My mother will buy a pot and I will plant watermelon in it ... (C, 14).

... I also make compost in our garden but it is not ready to use yet. I will wait for the composting process to be complete (C, 19).

There are trees and grass in our garden. There is a tree that I do not know the name of. There are the things that are similar to small tomatoes on it and it has thorns on its branches. The rose bush also has thorns. There is a pine tree. There is a beautiful thing. There is a



yellow flower that smells very nice. However, there are no animals in our garden ... (C, 5).

I live in a clean environment at present. However, there is a place opposite our house and there is a wall near this place. Everybody throws their garbage there. Therefore, my friend cannot breathe. Fortunately, she can be taken to the hospital before she suffocates (C,1).

... There is a tomato that I have planted in our apartment garden. There is basil that I also planted in the garden. There is a rabbit in our garden and I feed it. I want to feed a rabbit at home but my parents will not buy me one because my brother is afraid of them ... (C, 8).

*Environmental pollution.* The analysis of children's perceptions about environmental pollution revealed that it evoked only associations with 'non-environmentally friendly behaviors (such as not recycling, throwing garbage on the ground)' for 4 of the 24 children. In addition, 14 children said environmental pollution made them think of 'both non-environmentally friendly behaviors and pollution (such as air pollution, visual pollution, etc.)'. Two children mentioned 'both non-environmentally friendly behavior and environmentally friendly behavior (such as protecting the environment, putting recyclables into the recycle bin and putting non-recyclables to the garbage bin)', three said 'environmentally friendly behavior and pollution' with only one child describing all of these items.

The extracts from the interview, given below, reflect the kindergarten children's ideas about environmental pollution.

You told use a story; in that tale the children did not know about recycling; therefore they put everything into the same bin. As in the tale, if there people have no knowledge of recycling and do not throw garbage into the garbage bin, the environment becomes polluted (C, 1).

The air and visual pollution come to my mind. Things have very much polluted our world. Antennas cause visual pollution. Soil is lifted as sand particles fly in the air when the weather is too windy and this causes air pollution. It can be harmful to our eyes. In addition, the [exhaust] gas from cars causes air pollution (C, 12).

I think of air pollution because of wind. Everywhere is polluted. When the world is polluted, space is also polluted. When space is polluted, the outside of the space is also polluted ... (C, 4)

Protecting the environment comes to my mind. Unless we protect the environment, flowers will wilt, animals will die and trees will not grow (C, 11).

It makes me think of a bad world. Everybody throws the things they eat and drink onto the ground. There are lots of garbage bins but they do not throw things in them, it is always on the ground. They see that recycle bins are empty when they come to take recyclables. Someone comes and throws the recyclables into the recycle bin and the non-recyclables into the garbage bin (C, 21).

I think that it is about this place being polluted. For example, when the environment is polluted, - cleaning it comes to my mind ... This place can be very dirty. This place is polluted because of garbage (C, 23).

I think about the environment not being polluted comes to my mind. We should not throw garbage on the ground or recyclables into the garbage bin so the environment will not be polluted (C, 17).

Of the 24 children 15 explained the reasons for environmental pollution as both 'garbage' and 'waste'. While seven children only referred to 'garbage', two children saw 'garbage', 'waste' and 'organic waste' as the causes for environmental pollution.

The kindergarten children's responses presented below exemplify their ideas about the causes of environmental pollution.

It [the environment] is polluted with garbage and bird wings. When bird wings fall to the ground they also pollute the environment (C, 23).

I will demonstrate [by miming]. There is a ripped book, we read it and we do not use it anymore. We throw it in the garbage bin instead of the recycling bin. This is not a good thing. For example, we have a chair but it is broken. We throw it into the garbage bin rather than asking our father to repair it ... For instance, when we speak very loudly like this, it becomes noise pollution... (C,9).

When fruit peel, potato peel, and chewing gum packaging are thrown on the ground the environment becomes polluted. It is also polluted with garbage (C,18).

For example, when we pour orange juice and throw something [garbage and waste] on the ground the environment becomes polluted. If we throw fruit peel down rather than composting it, our environment becomes more polluted (C,21).

*Garbage.* The analysis of the interviews revealed that all of the children (n=24) described garbage as ‘non-recyclables items’. Two added the notion of dirtiness, and four made reference to the recycling symbol. Below are related extracts from the kindergarten children’s descriptions of garbage:

Mud, pastels, poop and pee are garbage because they are not [cannot be] recycled (C, 10).

For instance, wood, shoes, wet wipes, napkins are garbage because they are not [cannot be] recycled (C, 19).

Wet wipes are garbage because they are not [cannot be] recycled but the boxes of wet wipes are recyclable. Toilet paper is also garbage but the inside part made of cardboard is not garbage because it is also paper which means it is recyclable (C, 20).

For example, pastels and shelves are garbage because they are not [cannot be] recycled. In addition, there is no recycling symbol on them. Moreover, no humans are recycled (C, 9).

Wet wipes and napkins are garbage because there is no recycling symbol on them. In other words, they are not [cannot be] recycled (C, 14).

Dirty things are garbage, such as wet wipes, wood, napkins because they are not [cannot be] recycled (C, 13).

Moreover, all the kindergarten children said that garbage could not be recycled and was taken to the dumping ground. Two children added that it was buried at the dumping ground, while one child said it was burned. The kindergarten children’s perceptions of the properties of garbage can be seen in the following extracts from the children’s responses:

No [garbage is not recycled], it [garbage] goes into the garbage bin and dustmen take it to a large dumping ground that pollutes the environment (C, 9).

No [garbage is not recycled], some people dispose of packaging waste in the garbage bin because they do not know any better. First, they are separated, then the recyclable items are taken to recycling centers and non-recyclables are taken to large dumping grounds (C, 8).

No [garbage is not recycled], it [garbage] is more polluted and becomes viscous and looks like ... Non-recyclables go into the garbage and then to the dumping ground (C, 6).

No [garbage is not recycled], we dispose of non-recyclables in the garbage and the dustmen come and put it in their trucks and take it to the dumping ground (C, 17).

No [garbage is not recycled], non-recyclables go to the dumping grounds. They dig a huge hole and put the garbage in this hole (C, 21).

No [garbage is not recycled], non-recyclables are thrown in the garbage bin. The dustmen come and take it to the dumping ground with their trucks and bury it in the soil (C, 11).

No [garbage is not recycled], it goes to dumping grounds and is burned there (C, 5).

In this sub-section, pertaining to precursors of disposing of garbage, even though all the kindergarten children disposed of garbage in the garbage bin both within the school and home environments, they gave different explanations regarding their precursors for their action. For nine children the precursors were ‘personal investment–environmental consequences’. For instance, C (17) stated, *“I dispose of it [garbage] in the garbage [bin] to keep the environment clean. If we throw garbage on the ground, the environment is polluted, everybody will fall down while walking, there will be a bad smell because of the dirtiness and then people will not be able to walk, and there will be garbage piled up beside every house”*. C (24) also said, *“I put it [garbage] in the garbage bin so that our world will never ever be polluted because of us and will become very very clean. If we do not do like this, our world will not only be polluted but also smell worse.”* In addition, six children’s actions were based on ‘environmental knowledge’ with one of them stating, *“I dispose of it [garbage] in the garbage bin because it is garbage and is not recycled”* (C, 6). For nine children both ‘personal investment–environmental consequences’ and ‘environmental knowledge’ precursors were applicable. C (1) illustrated this by stating, *“I dispose of it [garbage] in the garbage bin because it cannot be recycled*

*and can damage the recyclables if they are mixed with the garbage. In addition, if we throw garbage on the ground the surroundings become polluted and we can be harmed by the smell of the pollution.” C(10) said, “I put it [garbage] in the garbage bin because it is garbage—which means it is not recyclable and compost cannot be made from it—so our environment is not polluted and thus the garbage monster [from a story in the 3R implementation] will become small, smaller, smaller.”*

Furthermore, in this sub-section, when the children were asked “What should we do to reduce the amount of garbage? And why should we do this?”, they made different suggestions. More than half of the children (n=14) out of 24 proposed ideas related to ‘recycle/separate’ and two children gave ideas connected to ‘reduce/reducing consumption’. In addition, one child’s response was related to ‘reuse’, for two children their response was coded as ‘disposing garbage in the garbage bin’ and five of the children made more than one suggestion. Moreover, more than two-thirds of the children (n=17) gave responses that were in the category of ‘personal investment–environmental consequences’, four under ‘personal investment–economic consequences’. Also, three children were identified as having the basis of ‘environmental knowledge’ precursor for their suggestion.

Below are extracts from some of the kindergarten children’s responses concerning their suggestions together with the precursors allocated to their desire to reduce garbage:

We should throw garbage in the garbage bin and recyclables in the recycle bin if not much more garbage will accumulate in our world. The flowers and trees grow up, grow up, and grow up. If we throw everything onto them when they are smallish saplings they can be damaged. Even if they manage to grow up, they are exposed to the effect of napkins and plastic materials....If it is an apple tree, its apples will be polluted, if it is an orange tree, its oranges will also be polluted and thus we will also eat this polluted fruit. In other words, we should reduce garbage otherwise the environment will be polluted (C, 21). (*recycle/separate, personal investment–environmental consequences*)

We should dispose of packaging waste in recycle bins and garbage in the garbage bins. If we do not do this, the dumping ground will

become as in the tale [told to the children as part of the 3R implementation] (C, 5). (*recycle/separate, personal investment–environmental consequences*)

We should dispose of things [packaging waste] in recycle bins because if nothing [packaging waste] is left, there is nothing [any material] we can do [construct] (C, 14). (*recycle/separate, personal investment-economic consequences*)

... Of course, first of all, you should collect it [packaging waste] and then put it into a blue garbage bag and dispose of it in a recycle bin. They [the staff dealing with recycling] take it to the recycling center. In other words, we should put packaging waste into the recycling bin because if we do not, it cannot be used, and then, it is wasted again (C, 15). (*recycle/separate, personal investment-economic consequences*)

We should put it [garbage] into the garbage bin to reduce garbage so the environment is not polluted (C, 2). (*dispose of garbage in the garbage bin- personal investment–environmental consequences*)

We should put it [garbage] in the garbage bag. When we do this, [the amount of] garbage is reduced and the dustman takes it [away] (C, 6). (*dispose of garbage in the garbage bin-environmental knowledge*)

When we cannot use it [packaging waste] anymore; we can take it to the recycling center. It is recycled there and then filled and the covers are closed, which means that the former [items] are sent to markets. We can do it with things like that that are not needed. For example, toys that I don't need or are broken toys are put into a bag then my mother and I will give them to someone so they can be used again (C, 4). (*more than one precursor - personal investment-economic consequences*)

*Recycling and Packaging Waste.* After the implementation, all the kindergarten children (n=24) were able to recognize the recycling symbol. In addition, 18 children could explain the meaning of the recycling symbol as something ‘that is used to designate recyclable materials’ and ‘recycle, reduce and reuse (the meaning of three arrows on the recycling symbol)’ and six children described it as ‘that which is used to designate recyclable materials’. Ten children described the place the symbol can be seen as ‘at school–on the recycle bin’. For instance, a child said, “Yes, I see it [the recycling symbol] on the recycle bin at school and on that [indicating the back of his pastel box]. It means recycling. Reduce, reuse and recycle” (C, 13). C (20) also stated, “Yes, I see it [the recycling symbol] on the blue waste bin at our school. It

*means recycling. In other words, they recycle new things again and again like these arrows that show ongoing cycling.*” Furthermore, four children said ‘at school, on a video’. For example, one children said, *“Yes, I see it [the recycling symbol] when we watch cartoons in class [during the 3R implementation]. It means to recycle. Reduce, reuse and recycle”* (C,4). Three children said they had seen the symbol ‘on packaging’. To illustrate, one of them remarked, *“Yes. It [the recycling symbol] is on all paper, metals, glass and plastics. It means recycle. These [arrows] mean reduce, reuse and recycle”* (C, 8). Moreover, one child said ‘at school–on books’ using the following words: *“Yes, it [the recycling symbol] is on our school books and on the books you brought. It means recycle and shows recyclable item”* (C, 16). Lastly, six children’s responses fell under the category of ‘other’ since their responses were different from the rest in terms of especially the place of recycling symbol. For instance, C (2) affirmed saying, *“Yes, it [the recycling symbol] is on the recycle bin at Çiçek Stationery [shop] and also in our home. It means recycling. Reduce, reuse and recycle.”* C (21) also gave an affirmative response saying, *“Yes, I see it [the recycling symbol] on the recycling truck that passes by when we are in Kızılay. It means recycle. Also reduce, reuse and recycle.”*

Additionally, the analysis of the post-interviews indicated that all the kindergarten children could identify all types of packaging waste, namely paper, plastic, glass and metal in the photographs given in Appendix A. Furthermore, all the children understood all the different types of packaging waste that could be recycled and could also give examples of what each type of packaging waste could be used for after recycling.

Some of the kindergarten children’s responses about the recognition of and the recycling process of paper, plastic, glass and metal are as follows:

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into new notebooks by compressing it. Plastic is recycled into plastic materials again. Glass is recycled into water glasses, glasses and jars again, and metal is recycled into metallic materials again (C, 1).

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into boxes. Plastic is recycled into pipes. Glass is recycled into jars, and metal is recycled into picture frames [like those shown in the videos played during the implementation] (C, 4).

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into paper. Plastic is recycled into shoes. While watching cartoons I have seen it [Plastic is recycled into shoes.]. Glass is recycled into glass bottles to catch ladybirds with, and metal is recycled into toy houses that are made of metal (C, 9).

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into paper again. Plastic is recycled into small plastic bottles. Glass is recycled into the glass part of picture frames, and metal is recycled into robots. Robot toys are made up of metal and painted and decorated (C, 11).

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into books. Plastic is recycled into buckets again. Glass is recycled into water glasses, and metal is recycled into metallic materials (C, 12).

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into new paper and boxes. Plastic is recycled into plastic materials such as straws. Glass is recycled into glass, and metal is recycled to metallic boxes and tins (C, 15).

These [the materials in the photographs] are made from paper, plastic, glass and metal. All of them can be recycled. Paper is recycled into boxes. Plastic is recycled into plastic materials again. For example, when this [the plastic part of a pencil] is broken, it can be recycled back to its former shape, meaning into the plastic part of a pencil again. Glass is recycled into vases, and metal is recycled into tools that gather metallic things (C, 21).

Furthermore, the analysis of the children's responses related to the question "how is packaging waste recycled?" showed that all the kindergarten children (n=24) could explain the process of recycling waste packaging from the time it is disposed of in a recycling bin until it becomes a new product. The following extracts contain



the kindergarten children's explanations about the recycling process of packaging waste.

There is a huge machine. There is an escalator like the ones in shops. It is similar to a straight escalator that goes along, but it is a band. It [recycled material] all goes on the band. One person separates only glass, the other separates paper. The person that gathers the paper puts it into a machine and it is recycled. After that another machine crushes the paper and makes a notebook. This process is similar for plastic, glass and metal [this is as mentioned by a guest speaker during the implementation] (C, 1).

First of all, they [the packaging waste] are separated one by one because we put them all of them in the same bin. They gather them with other recyclables and separate them into paper, plastic, glass and metal. Then they put them into the machines. After that they are recycled (C, 5).

First, a man puts them [packaging waste] in the recycle bin. Then they are taken to the recycling center by a recycling truck. After some operations they are recycled into new things (C, 7).

... They [the packaging waste] are taken to the recycling center; for example, they recycle a box. I [it] become a box, how nice I [that it] become a pipe [as depicted in the video played in class during the implementation] (C, 15).

We put things [the packaging waste] in the recycle bin. They are taken by a recycling truck to the recycling center. First, they are melted at the recycling center; then there is a machine that recycles them at the center. Then they come back to us as glass. Plastics are broken like glass and then melted. After that they are recycled into new things. Paper is gathered, wetted and then it is recycled into new things (C, 21).

Another question that was posed to the children in this sub-section was "What should be done to recycle packaging waste?" The analysis of children's responses revealed that 14 out of 24 children described it as being put in the recycle bin and six of them stated that waste and garbage should be separated. In addition, two children said that waste was taken away to 'a recycling plant/center' and two children believed that waste was disposed of in a recycle bin and taken away to a recycling plant/center. Furthermore, for twenty children 'personal investment–environmental consequences' were their precursors for their reasons why packaging waste should be

recycled. For instance, C (1) stated, *“We should put it [packaging waste] in the recycle bin because even if it is waste it can pollute our environment. If our environment is polluted we cannot breathe and thus may die.”* C (11) said, *“We should put it [packaging waste] in the recycle bin. If not, we can’t be sure if it will be recycled. Unless that is ensured, worse things will happen. For example, we may become damaged. Places become very polluted and thus we are harmed.”* Furthermore, C (20) explained by saying, *“We should use fewer things that become garbage or waste. For instance, fewer wet wipes and napkins, then nature can be nice. We should not dispose of nylon bags in nature; after use we should reuse them. We can dispose of nylon bags that cannot be used anymore. Some children do and I also do various things with boxes. Sometimes I find a bag that is the same height as I am and I cut off the edges and then wear it so my clothes are made of the plastic bag. I put my feet into the bag through the small holes.”* The remainder of the children (n=4) had the precursor ‘environmental knowledge’ as their reason for why packaging waste should be recycled. For example, C (3) stated that *“We should put it [packaging waste] in the recycle bin because then they can be taken to the recycling center by a recycling truck and then recycled there.”* C (4) said, *“We should put it [packaging waste] in the recycling bags. The recycling trucks come. Men take the waste and put it in the back of the truck like dustmen put garbage in the garbage truck. It goes to the recycling center. When it arrives at the center the truck dumps everything into a machine. From there, it goes onwards and people separate them while they are on their way to entering the machine. Then machine, person, machine, person, and after it becomes things we use.”*

The next two questions that were posed to the children in this sub-section was “Where is the nearest recycle bin(s) at school?, Is there any recycling bin at your home?” It was observed that all children (n=24) were aware of the existence of the recycling bin in the school garden. Three of them also described the other recycle bins in the corridor of the school. Six also mentioned the recycle bins that they had built in the classroom as a part of the 3R implementation.

Examples of the kindergarten children's descriptions of the location of the recycling bin are given as follows:

The blue box. It [the recycle bin] is near the park in the school garden (C,7).

In the garden (C, 11).

There are recycle bins near the green table in our classroom. There is also one in our school garden (C, 17).

There are recycle bins in our classroom that we built. There are three bins in the school. Two of them are in the corridor and one of them is outside, which means that the blue box is in the garden (C, 20).

Regarding the location of the recycling bin within the home district, 12 out of the 24 children knew the exact position of the recycle bin, while seven stated that there was/were no recycle bin(s) in their home district. Although five children asserted that there was no the recycle bin(s) in their home district, they described where else they could be found.

Below are sample extracts from the kindergarten children's descriptions of "where the recycling bin was located" in their home environment:

There is a recycle bin near our house. You go down and turn left to reach it (C,21).

Yes, when you go out our home, you can reach it [the recycle bin] (C, 10).

There is not, but while walking I see the blue colored recycle bins (C, 15).

No, there is only a recycle bin found at our school (C, 17).

I have not seen one (C, 11).

The last question posed in this sub-question read as follows: "What will happen if we don't recycle?" It was observed that the responses of 16 out of the 24 children fell into the category of 'personal investment–environmental consequences'. For instance, C (9) stated, "*Nature is like that. Plants are like that, animals are like that, auwww, humans are like that [she role plays how nature, plants, animals and*

humans are affected by this situation]. It will not rain, the sun will not shine and forests will disappear.” C (24) remarked, “It will become worse. Our clothes will become worse. Our house will become really polluted. When we are in the garden we will smell worse gas odors, and our world will also become very dirty. In addition, when we are in the garden and want to play with toys, that dirty odor will permeate our toys and thus we can never play with them. The spoons we use to eat may also become worse. All carboys and the water in them will also be dirty. We will not be able to touch them with our hands. We will never be able to drink water and may almost die from being breathless.” Six of the children gave responses that were considered in the ‘personal investment–environmental consequences’ category, they explained these consequences through the tale told during the implementation of the 3R implementation. For example, C (5) uttered, “A garbage monster will be formed [the story from the 3R implementation]. It will come to our houses and knock on the door and we will have to run away. We should recycle so we don’t have to run away.” Similarly, C (7) stated, “The whole world will be polluted and the garbage monster will appear. We pollute everywhere. Fish, which means animals, plants, trees and humans are affected by this situation.” C (20) said, “Worse things will happen. Things will become really polluted. The dumping grounds will become bigger, bigger, and then the mountain of garbage will spread out all over and everybody will wish they hadn’t thrown things away and will cry. Therefore, they will be really worried. If the garbage becomes bigger like that, there will be no place for us, animals and plants to live and it will cause damage. Then all the animals will escape and plants wilt. Animals will escape to the place where people recycle. In other words, we should recycle so there will be less garbage and pollution.” Moreover, one child’s response was in the category of ‘personal investment–economic consequences’ as shown in this extract: “We will no long be able to buy the goods that we use. We will spend money unnecessarily [a large amount of money] to buy them” (C,4). Besides, one child’s explanation indicated that not recycling would bring about not only ‘environmental consequences’ but also ‘economic consequences’ with these words: “We will not have anything. For example, there will be no glass and plastic bottles which means that in addition,

*animals, plants, people, we will be damaged. In other words, all living things will be damaged” (C, 14).*

#### ***4.2.2.1.2 The precursors of composting behaviors exhibited by the kindergarten children.***

This sub-section presents details of the precursors of eco-management and persuasion behaviors regarding composting exhibited by the kindergarten children within both the school and home environments. The results are also supported by the responses of the children’s parents and the teacher.

After completing the 3R implementation, all the children declared that they composted at school and the ‘personal investment–environmental consequences’ was determined to be their precursor. Below are some extracts from the kindergarten children’s explanations regarding their implementation of composting organic waste at school:

We can dispose of it [the organic waste shown to him in photographs] in wooden crates in the garden. It begins to convert into compost...The things we dispose of convert into compost. We put it [compost] around the bottoms of trees, which is not only healthy but also unhealthy. Thus, the trees become healthier and grow. We should use compost not only for trees to become healthier but also so that the fruit we do not eat is not put in the garbage bin (C, 4).

We make compost. One of them [designated composting areas] is inside the wooden crates in the garden, the other one is inside the aquarium in the classroom. In this way, fruit peel can be useful. Then we give it to the fruit trees and plants so they grow. Sometimes people collect the compost, and then they can take it and spread it around the forest (C, 20).

We make compost for worms, ants and insects to live in and the plants grow much more and become healthier, then if we eat and drink them [plants] we become clever and our brains work better (C,24).

The teacher commented that *“the children followed and actively participated in the process including mixing and moisturizing compost in the garden and in class at regular intervals.”*

As for the home environment, six children disposed of organic waste in the garbage bin due to ‘situational factors’, especially ‘social pressure’. For instance, C (1) said, *“These [organic waste shown to her in photographs] are used to make compost. We cannot make compost from these [organic waste shown to her in photographs]. My mother always puts apple waste in the garbage bin. I tell my mother to make compost. She still puts them in the garbage bin because she does not know. I say I know but she says, ‘No, you don’t understand’”*. Likewise, C (9) said, *“We dispose of it [organic waste shown to her in photographs] in the garbage. We cannot make any compost because I cannot get permission from my mother. When I want to make it she says ‘Noooooo.”* Four children put it [organic waste shown to them in photographs] in the garbage bin due to ‘situational factors’, in particular the ‘lack of facilities’. As one of them said, *“We put it [organic waste shown to him in photographs] in the garbage bin because there is no place to compost in our garden”* (C,13). Moreover, three children put organic waste in the garbage bin owing to lack of ‘environmental knowledge’. For example, one of them stated, *“My mother does not make compost because I have not taught her how to make compost”* (C, 5). In addition, two of them put organic waste in the garbage bin on account of ‘personal investment–environmental consequences’. For instance, a child said, *“We put it [organic waste shown to him in photographs] in a separate bin. After it accumulates there, we put it in plastic bags and leave it near the other garbage outside. We do it in this way, so the environment is not polluted”* (C,17). Lastly, three children’s responses did not conform to any of the established categories and so were labeled ‘dispose it [organic waste shown to them in photographs] into the garbage bin–other’. For example, one of them stated, *“We put it [organic waste shown to her in photographs] in the garbage bin because they are not recycled”* (C, 19).

Four children were fortunate to be able to compost at home, one child made compost in the village and another child intended to make compost at home based on the ‘personal investment–environmental consequences’. Thus, C (14) said, *“I put it [organic waste shown to him in photographs] in a place where worms live because the worms eat it and convert the peel into compost; in this way the worms will not*

*die. We use that compost so our plants will grow". C (21) elucidated his/her composting activities thus, "My classmates and I collect it [organic waste shown to her in photographs] around our tree house. Then we take our spades and we bury it very deeply in the soil. Sometimes we find worms. First, we put them on our hands to examine them, and then we throw the fruit peel there with the worms and cover both with soil. We do this in order for the worms to convert it into compost. They eat, eat, eat and then the compost is complete. Then if we give it to saplings they grow, grow, grow and become trees."*

The extracts from the parents' responses given below confirm their children's statements related to composting at home:

...we also tried to compost in the basin at home. However, it takes a long time for the compost to convert and thus unfortunately we cannot do this with all organic waste ... (P,5).

... Unfortunately, we still throw fruit peel, which means organic waste, into the garbage bin because there is nowhere to bury or plant them. In other words, we cannot put it in front of the apartment, therefore it will continue to be put in the garbage bin (P, 10 & 24).

#### ***4.2.2.2 The precursors of reduce/ reducing resource consumption behaviors exhibited by the kindergarten children.***

In this section, the precursors of eco-management and persuasion behaviors concerning reduce/ reducing consumption exhibited by the kindergarten children within both school and home environments are analyzed. The results are corroborated with the responses from the teacher and the parents during the interviews.

The examination of the kindergarten children's responses related to both school and home environment indicated that the preference of five out of the 24 children to reduce their consumption could be categorized as due to 'personal investment–environmental consequences'. For instance, C (11) stated, "...because if we don't [reduce], a lot of garbage accumulates and starts to become hazardous to the environment." In the same vein, C (19) said, "We should not dispose of things

*very much. We should put recyclables into the recycle bin and non-recyclables into the garbage bin...If we use them [recyclables and non recyclables] a lot, they will accumulate, and outside houses, which means our environment will be very dirty.”* Another similar explanation was made by C (20), who said, “*...If do not [reduce/reduce consumption], garbage will accumulate and be taken to dumping grounds. After that the dumping grounds will become bigger, bigger, and afterwards spread to the surroundings until it reaches homes, and then people will notice how much worse the odor is. All recyclable things that are disposed of become garbage. At that stage, people will be worried and say they wish they had not disposed of those things, and then they clean those places. They put recyclable things into the recycle bin and after that they send napkins again to the dumping grounds as in the tale you told us. In that tale people also put recyclables in the garbage bin and the garbage monster comes to life and gets bigger, bigger, and begins to frighten people in the city. In addition, the health of people and other living things in that place is negatively affected and they can die from the odor”*. In addition, one child’s response related to reducing consumption was in the category of ‘personal investment–economic consequence’ as seen in this extract: “*[Reduce/reducing consumption means] not using the things very much because if we use too much there will be less money”* (C, 8).

In terms of the responses given by the teacher and parents, they supported the findings derived from the children’s accounts. They highlighted that children gave importance to utilizing less waste (i.e. paper, plastic bottle) and garbage (e.g. wet-wipes, napkins, packaging tape) given that children understood that both of them damaged the environment. For example, one parent stated, “*... My daughter gives importance to use less non-recyclables such as wet-wipes since she knows that they are non-recyclable and leads to environmental pollution”* (P, 20).



#### ***4.2.2.3 The precursors of reuse behaviors exhibited by the kindergarten children.***

This section presents findings related to the precursors (i.e. environmental or economic consequences as a part of personal investment) of the eco-management and persuasion behaviors regarding *reuse* exhibited by the kindergarten children within the school and home environments. These findings are compared with the teacher's and the parents' views.

The analysis revealed that five out of the 24 children advocated *reuse* on the basis of 'personal investment–environmental consequences'. For example, C (17) said, "*...so the environment will not be polluted.*" Similarly, C (9) expressed the consequence by saying, "*...because we want to protect nature.*"

In addition, two children elucidated the precursor of *reusing* as 'economic consequences as a part of personal investment'. To illustrate, one of them uttered, "*...My mother buys tape and I construct my own toy using the tape and reuse it because I want to create my own toy and also because some things we find that we think are finished can still be used again. For instance, the yoghurt container is reused by putting different things in it when you go on a picnic. If we put it into the garbage after drinking it, we have to buy one more and money is spent unnecessarily*" (C, 4).

The teacher's explanation verified the children's views with these words: "*...They also talk to each other about how to use these materials [packaging waste] during activities ... In particular, in their lunchtime, they have begun to talk about reusing the materials (such as bottles, containers)...*"

Below are given extracts in which the parents' explanations about *reuse* confirm the findings from the accounts given by the children.

My son has started to recycle but he insists on reuse by constructing new things for himself. He inspects the entire piece of cardboard to see if it has a recycle symbol. When he sees one he tells me not to throw it away because he will create something with it or use it in

some way. He does not think about put anything in the garbage bin. He finds solutions so as not to dispose of things, or for how to use it, he strives to convert one thing [waste material] into something else [such as a pencil box]. He thinks that we should not put things since they can be recycled into something else. It is very important to think about reusing things. He also guides me as to what I can do with things (P, 4).

There has been a tremendous change in my child. She has started to look at everything from a different perspective. Garbage, meaning waste, has become valuable. We can do something with it. We do not put it in the garbage bin. When I go home I build something with these things like a watering can. She starts to create something else from everything that she finds ... (P, 9).

... The most important change that I observe in my son is that he has started to reuse waste, such as empty toilet rolls. Before the implementation he ignored them, but now he has started to convert them into other things (P, 13).

#### **4.3 Parents' Ideas regarding the 3R Implementation**

This section presents the qualitative results based on the responses given to the research question, "What are the parents' ideas regarding the 3R implementation and their reflection on their home environment?"

As understood from the findings, the 3R implementation produced considerable degree of changes in not only in children but also in the behavior of their parents, and siblings' behaviors. The findings revealed that 19 out of 23 of the parents indicated that they observed changes i.e. in their environmental knowledge, attitude and behavior towards environment in their home environments after the intervention.

On the other hand, four parents reported that there had been no change in their home environments. One of the mostly mentioned reason was related to 'personality factors–attitude' (n=2). For instance, one stated, "*She [my daughter] is struggling with collecting especially packaging waste [paper, plastic, metal and glass] separately; unfortunately, we are ignoring her efforts. As a result there has been no change in our home*" (P,8). Furthermore, for two parents the reason could be attributed to 'situational factors'. To illustrate, one of them stated, "*There is no*

*change at home [still we do not recycle] because all the garbage is collected all together at the same place. If they were taken separately, I would recycle. There is no recycle bin near our house. There is, however, a recycling bin on my way [from home to the school] but you have to carry it there” (P,22).*

On the other hand, a closer examination of the parents’ responses indicated that the intervention also led to some changes in the parents’ behavior (n=11). Seven of the parents said that they had begun to recycle as one of them stated, *“We have also started to recycle at home. As I mentioned before, we already recycle at the shop. In addition, my daughter contributes to our consciousness. Before the implementation we did not do it [recycling at home] but now we do” (P,16).* In addition, one parent said s/he had begun to reuse material. She said, *“I reuse things much more. I put packaging waste in a different bag and put it outside. The people that separate garbage can easily see how we have separated things, though I cannot throw things into the recycle bin after separating them because there is no recycling bin near us” (P,14).* Similarly, two parents said they had begun to both recycle and reuse. For example, she stated, *“We disposed of everything in the garbage bin before but now we do not. We separate packaging waste. We also used to put a lot of things, especially broken things, but now we try to reuse them” (P,15).* Besides, one parent remarked that s/he had begun to both reduce/reducing consumption and reuse: *“I try to not to dispose of a lot of things such as plastic bottles. We attempt to reuse them and also try to reduce our garbage...In addition, after becoming environmentally conscious, I started to be against [buying] toys with batteries” (P,3).* Furthermore, five parents stated that they continued to recycle: *“We recycled before and continue to do so now. My daughter participates in the recycling process at home more actively after the project was implemented” (P,22).* Moreover, one of these parents emphasized that there had been a change in his/her environmental knowledge and consciousness in the following words: *“Before the implementation we also recycled irregularly. Now we have really become more conscientious. But now we separate items based on whether there is a recycling symbol” (P,20).* Additionally, three other parents noted that there had been a change in their child’s environmental

knowledge. For example, one of them stated, *“My daughter has started to inspect packaging and detergent boxes for the recycling symbol. When she sees it, she tells me ‘This is recyclable’. I hadn’t thought of it before. I didn’t look at them and put them into the garbage bin”* (P,12). Lastly, four parents noted there was no change.

In addition to the impact of the intervention on the parents’ behaviors, an examination of the parents’ responses clearly indicated that there was an impact on the attitudes and behaviors of the other children in the family (n=10) as well. Seven parents observed changes in environmental knowledge of their other children. For instance, P (12) stated, *“My daughter also tells her sister about recycling by demonstrating the recycling symbol. She explains its meaning. When her sister tears paper, she gets angry and asks her, so, do you know how many trees are cut for this paper!?”* Similarly, P (7) said, *“She [my daughter] tells her siblings [her brothers] that waste and garbage should be kept separately by pointing to the recycling symbol. She says that if this symbol is on packaging, it is recyclable.”* Furthermore, two parents said that they continued to recycle but shared this process more with the other family members. For example, one of them explained, *“My son is also quite conscious about this subject. He and his elder sister have begun to discuss recycling more. For example, when they play together they talk about the recycling symbol on the toy boxes and say, ‘We should put it in the recycle bin and then it will become like this [the toy box] or that [something different from toy box]”* (P,17). Furthermore, one parent remarked on a change which can be categorized as ‘personality factor–attitude’ as follows: *“Her elder sister had some idea about recycling because she also attends the same school, but her tendency to recycle increased due to my younger daughter”* (P,16). Moreover, the twins in this study and their parent articulated the interaction, thus: *“They have started recycling. They recognized its importance. They influence and warn each other; they have started to talk about recycling”* (P,10-24).

To conclude, seven out of 23 parents reported the changes within their home environment as they had begun to recycle. In addition, three others reported that they had begun to both recycle and reuse. Furthermore, three parents reported that they

had begun to *reuse* and *reduce/reducing consumption*, and two of them said that they begun to *reuse*.

Some of the parents' responses relating to changes within the home after the implementation are given here:

Before the implementation, we had already been recycling at home. We separate packaging waste, organic waste and household waste [leftovers]. My son has also seen this [application at home] but the 3R implementation has been a tremendous contribution. Nowadays, he also recycles (P,2).

We had already talked about recycling at home before the intervention but not as much as we are doing so right now. We collect the mineral water bottles and put them in the recycle bin located nearby (P,11).

We have started to recycle at home. We separate packaging waste from garbage and put them into different plastic bags. In addition, we do not put any boxes [milk cartons, yogurt containers] in the garbage bin anymore. We wash and clean them properly then we reuse them, especially as toys (P,4).

We have just started to recycle at home after the intervention. Now, we collect batteries separately in addition to packaging waste, organic waste and household waste in different plastic bags. One of the purposes of recycling is less garbage accumulation. We have also started reusing items. For example, we use the daily milk bottles by putting something into them...in this way we decrease the amount of the garbage produced per day. In fact, our caretaker said, 'I guess you do not eat anymore (P,5).

We do not put plastic bottles in the garbage bin anymore. Instead, we reuse them. As a family, we try to reduce our garbage, and reuse a lot of things instead of disposing of them as garbage (P,3).

Yes, there has been a change at home. We have started to reuse the plastic bottles. Instead of disposing of fruits seeds, we started planting them (P,9).

#### **4.4 The Teacher's Ideas regarding the 3R Implementation**

This section focuses on the findings of the present study regarding the teacher's response related to research question-4 which was, "What is the teacher's idea regarding the 3R implementation and its reflection on her home environment?"

This research question examined whether the 3R implementation had any influence the teacher had changed her behavior and perceptions in her daily life.

The teacher reported that she had started recycling especially glass and plastic at home. She also indicated her willingness to continue to implement the 3R implementation herself using the same format in the following year.

A sample quotation from her interviews is presented below:

... In particular, I have also begun to separate glass and plastics at home... because at home, we consume and use things with packaging mostly made from glass and plastics. Thus, I try to collect them in a different place [from the garbage]... Your implementation is the first practical application of its kind with the kindergarten children, their parents and teachers at this school. [As a result of your implementation] students have become more conscious [about the 3Rs and composting] at an early age. Furthermore, I will implement the 3R environmental process with the children in next year's class.

To conclude, the findings revealed that the teacher was also influenced positively by the 3R implementation since she also began to recycle in her daily life and she was eager to apply the 3R implementation with her class in the following year.

To further clarify that changes had occurred in the behaviors of the kindergarten children, their parents and their teacher related to the 3R implementation, their responses to interview questions were compared and contrasted in the following part.

#### **4.5 Comparison of Pre- and Post-Implementation**

In this phase, the data collected from pre- and post- implementation phases were compared and evaluated to unveil the influence of the 3R implementation on children's eco-management and persuasion behaviors relating to the 3Rs, and their predictors.

Firstly, the children's *behaviors relating to recycling, reducing, reusing including composting* were compared and contrasted (See Figures 4.3 and 4.4).

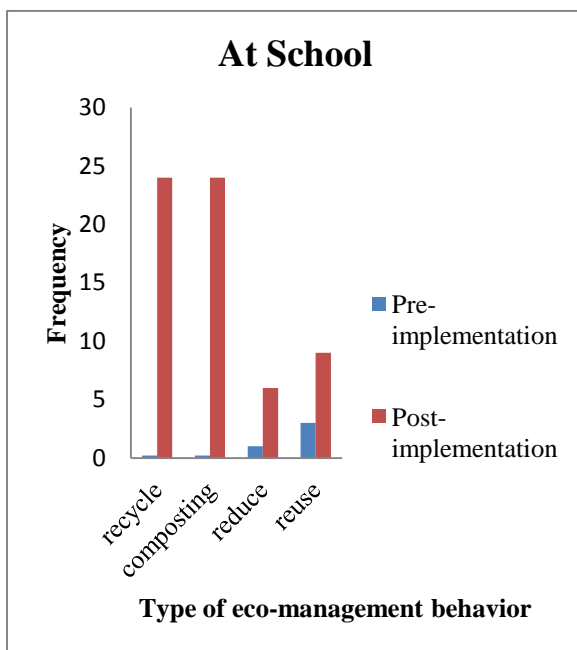


Figure 4.3 The frequencies of kindergarten children’s eco-management behaviors at school

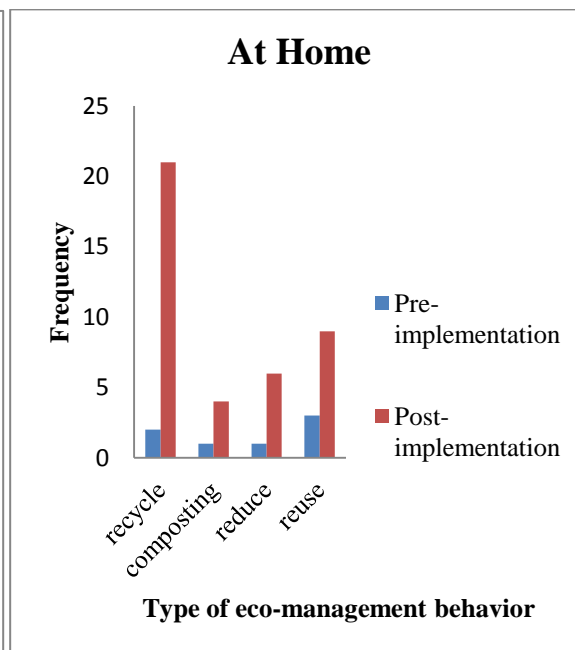


Figure 4.4 The frequencies of kindergarten children’s eco-management behaviors within the home environment

Within the school environment, after the implementation, all of the children (n=24) began to separate garbage and waste, and dispose of recyclable materials in the recycling bin; none of them had done so beforehand. Six children started to reduce, especially non-recyclables, such as napkin wet-wipes, tape and glue. Further, nine children started to reuse especially packaging waste, such as plastic, glass bottles and containers as well as paper (4.3).

Notably, in the post-interview, the children gave detailed explanations about the recycling process, such as how recyclable items, such as paper, plastic, and glass were collected and sorted; they were also able to describe the recycling process. They emphasized that it was important to recycle in such a way that when waste was recycled, it would be converted into products that could be used again. They also gained awareness about the positive effect of recycling on the environment. It can be said that they became more environmentally concerned. Finally, before the implementation, the children had complained about the presence of some situational factors, namely, the lack of recycle bin(s) in their surroundings, and a lack of support

from their elders, which prevented them from especially recycling and composting. After the implementation, however, these factors did not emerge. Conversely, they elaborated on how they went about recycling at school.

Additionally, the comparison of the pre- and post-interviews revealed that before the implementation, the majority of the participants (n=15) were not aware of the impact and significance of recycling. This can be attributed primarily to insufficient environmental knowledge, since most of the participants (n=10) gave answers that were irrelevant to the specifics of the issue of recycling. For instance, children listed consequences for not recycling. Some examples are: “We will lose our way”, “We will become tired”, “It can come back”, “It stays that way”, etc. More comprehensive information pertaining to change in environmental knowledge will be presented in the following part. On the other hand, after the implementation, twenty-two of the children gave more importance to “environmental consequences” in their answers to the question of what would happen if we did not recycle. In addition, some of the children (n=6) were inspired by the story that was told during the implementation, and used the imagery of the garbage monster when explaining these potential consequences. Furthermore, all participants were aware of the short-term and especially the long-term consequences of their behavior in the post-interview, especially regarding the environment and the living things that make up the environment. Finally, all the children were also able to explain the potential consequences for not recycling in detail, and with various examples.

It has been observed at home (See 4.4) that after the implementation, more participants, compared to the findings of before the implementation, began to recycle and/or reduce consumption and/or reuse materials. What’s more, a great majority (n=21) explained explicitly the reasons why they started recycling and they mainly highlighted the notion of “environmental consequences”. In the pre-interviews, no children did recycling actively at home, and this was explained through “situational factors”. However, after the implementation they explained how they went about resolving these factors, including solutions like constructing their own recycling bins, finding plastic bags in which to collect recyclables, etc. Some of the children



(n=3) had said they did not know how to recycle before the implementation. However, after the 3R implementation, they not only knew how to do it but were able to explain and act as role models to others in showing them how to recycle, reuse items and reduce consumption. Detailed information regarding the change in environmental knowledge will be presented in the following part. In the post-interview, those children who said “No, I do not recycle” added what they either did or intended to do in terms of other ecologically responsible activities, such as reusing items.

Comparison of the pre- and post-interviews indicates that before the implementation none of the children had composted at school or at home (See Figures 4.3 and 4.4). One child did report having made compost in the garden of his/her other house, adding that the family did not go there frequently. After the implementation, all participants made compost at school (Figure 4.3). Yet, six children were also able to make compost at home (Figure 4.4). Most of the children (n=10) who did not make compost at home cited situational factors that hindered them, especially lack of their elders’ support and a lack of sufficient garden facilities in their homes. Nonetheless, some (n=2) were confident that they could make compost if they could teach their parents how to do it as well. This demonstrates that the children had internal locus of control for resolving this issue.

The teacher also confirmed that there had been a change in all the children’s eco-management and environmental knowledge, consciousness and attitudes. Her memory of the program also confirmed that recycling also became a part of all the children’s lives. She reported that they were very much influenced by their active participation in the activities throughout the six-week implementation of the 3Rs. She additionally noted that the children had followed the composting process both in the garden and in the classroom with interest, especially when observing changes in the worms.

Analysis of the parents’ responses also justified the findings derived from the children’s interviews. For instance, after the implementation, twenty-one parents

reported that they observed changes in their children's behaviors relating to the 3Rs, including composting. The parents (n=2) who cited change admitted that they had ignored their children's efforts to do recycling. In addition, all of them pointed out changes in their children's environmental knowledge. They particularly mentioned the example of using the recycling symbol on products at home, and how their children demonstrated they knew how and why to recycle and compost, and how to distinguish garbage from waste. Some of them (n=10) remarked that there was a change in the children's environmental consciousness level, especially about what would happen if they did not recycle and become conscious consumers in order to reduce both garbage and waste, and to reuse items like plastic bottles and milk cartons. Three of them noted that the most significant change they observed in their children was that they began to see garbage and waste from a different perspective. They said that before the implementation their children did not consider the distinction between garbage and waste to be important, that everything was indiscriminately disposed of in the garbage bin, but that afterwards, they were striving to find ways not to dispose of recyclables in the garbage bin. They added that the children considered disposing of something in the garbage bin or the recycle bin to be the last option. Instead, they chose many other options, such as using plastic or glass bottles again and again, starting to use thermoses and flasks, and creating new things from waste materials. The parents further noted that their children had internalized the activities from the 3R implementation and that recycling became a part of their daily routines; for example, when the families brought home materials from the market, the packaging waste would be disposed of in the recycle bin.

To identify the changes in the children's persuasion behaviors and their precursors after the completion of the implementation, the children's *behaviors relating to persuasion about recycling, reducing, reusing and composting* were compared and contrasted. Firstly, the teacher's responses to the interview questions were analyzed, and then the parents' responses were analyzed.

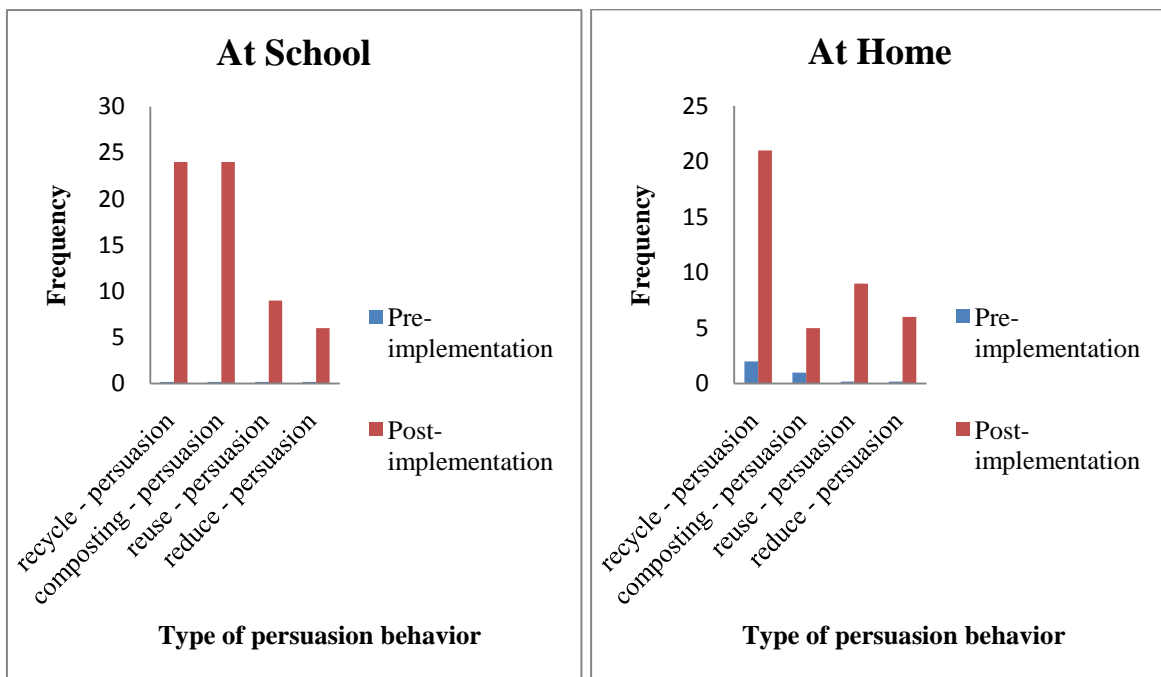


Figure 4.5 The frequencies of kindergarten children’s persuasion behaviors at school      Figure 4.6 The frequencies of kindergarten children’s persuasion behaviors within the home environment

The teacher, in her interview, said that she had observed a change in all the children’s efforts to persuade others, including informing, demonstrating, doing, guiding, warning and encouraging their peers about recycling and/or reusing materials and/or reduce/reducing consumption and/or composting (See Figure 4.5). She added that this had been the first intervention with kindergarten children, their parents and teachers at that school to deal with issues relating to environmental pollution, recycling and composting, and expressed her desire for another implementation the following year. This was a significant change on part of the teacher. It was inferred by her eagerness to continue the program that she was also very pleased to have observed these changes in the children.

After the implementation, 19 parents said they had observed a change in themselves, particularly regarding behavior, environmental knowledge, consciousness and attitude, thanks to their children’s efforts of persuasion. The children’s persuasive techniques included informing, demonstrating, doing, guiding,

warning and encouraging their parents about recycling and/or reusing materials and/or reduce/reducing consumption and/or composting. Those parents (n=4) who expressed no change admitted that this was due to their own carelessness or ignorance, since all of them confirmed their children had proposed separating waste and garbage at home. After the implementation, five parents said their children also began to influence other people in their surroundings, such as relatives and peers, and seven other parents witnessed their children's influence on their sibling(s) with regard to environmental knowledge and attitudes. They even shared information while they were playing. All in all, as seen in Figure 4.6, most of the parents (n=21) expressed that this educational program had a tremendous effect on their family (i.e. themselves and their children's siblings) and other people (i.e. their relatives and children's peers) in terms of recycling behavior as they expected. Furthermore, parents highlighted that thanks to their children's persuasion attempts, four of them started to make composting, nine began to reuse and six began to reduce.

The examination of children's both eco-management and persuasion behaviors related to the 3Rs and their predictors within both the home and school environments revealed that the most important change occurred in environmental knowledge. To identify the changes in the children's *environmental knowledge*, that is, the precursor to eco-management and persuasion following the implementation, findings related to the environment, environmental pollution, garbage, recycling and packaging waste were compared in detail.

When pre- and post-interviews relating to the *environment* were compared, the findings revealed that children's understandings about the environment and its components became more comprehensive after participating in the implementation. They could also explain the environment in more detail, by citing examples of biotic factors, abiotic factors and human-made things. Furthermore, some elements, such as habitats, recycling, garbage, garbage bins, recycling bins, and cleanliness became part of most of the children's (n=10) definitions of the environment. The children also viewed environmental cleanliness as generally important, and were able to name examples of specific behaviors and their impacts on the environment. In other words,

they realized the effects of both environmentally friendly and non-friendly acts on the environment and its components (biotic and abiotic factors).

The pre- and post-interviews with the children on the topic of *current environment* indicate that they had a more comprehensive understanding of the environment and its components after participating in the implementation. For example, many examples were cited, including growing plants, feeding animals, composting, garbage, waste, pollution and cleanliness. They also offered more and detailed examples of components of the environment, especially biotic components such as worms, insects, spiders, etc., and they gave more importance to these biotic factors. The children were generally careful observers of the current environment and its components, and provided detailed information about them. For instance, they understood why plants wilted or when they blossomed, whether their environment was clean or not, and where insects and worms lived. They were able to explain the cause and effect relationship of things that were happening in the current environment; that is, they were aware of the specific consequences resulting from certain events or actions, and the effects of these consequences on human beings and other living things. Also, they learned all this while sharing experiences such as planting a tree, feeding animals and making compost together. Some of them (n=3) also understood the impact of compost on living things.

Regarding the consequences of *environmental pollution*, the children's pre- and post-interviews revealed that they became more conscious about environmental pollution, as well as its causes and effects with respect to the environment and environmental components, especially biotic components (plants, animals and humans) over the course of their participation in the implementation. They were also more aware of solutions regarding environmental pollution. They could offer advice on how to combat garbage and waste problems; for example, by separating garbage and waste and by recycling. During the pre-interviews, the children tended to name "garbage" as a cause of environmental pollution but did not consider how the garbage got there or what could be done to solve the problem. Neither did they feel any sense of responsibility for keeping the environment clean, considering it the

responsibility of garbage men instead. In the post-interviews, however, some of the children (n=3) named specific types of pollution, such as air and visual pollution, and recounted related events from the tale that was told as part of the educational activities.

The contrast between the children's perceptions of reasons for environmental pollution between the pre- and post-interviews demonstrated that a great majority of them (n=17) became aware that not only garbage but also those wastes (extraneous things that can be recycled or reused) were causes of environmental pollution. In the pre-interviews they said that environmental pollution was caused by environmentally unfriendly behaviors and two of them had included the excretory products of living things (such as dry leaves or feces) in their definitions of environmental pollution. Some (n=9) had also suggested solutions like recycling and/or reuse and/or reduce during the pre-interview. The post-interviews, however, revealed that they learned not only to distinguish between garbage, waste and organic waste, but that they could also provide specific and detailed examples of each. Most of the children (n=14) articulated that garbage should be disposed of in the garbage bin and recyclables (waste) into the recycle bin. One child also pointed out that disposing of fruit peels and vegetables onto the ground instead of using them to make compost was an example of an environmentally unfriendly behavior.

As for the topic of *garbage*, in the pre-interviews the children generally defined it as something disposed of in the garbage bin or as gook; however, in the post-interview, all the children described garbage as "non-recyclable things". In the pre-interview, one child mentioned waste, but s/he conflated garbage and waste, as had the great majority of the children. In fact, most of them did (n=16) not realize the distinction between the two at the time of the pre-interview. However, in the post-interview all of the participants understood these differences clearly, and all gave specific examples of garbage, accompanied with explanations as to why these were considered garbage. Four children also pointed out the recycling symbol to distinguish between waste and garbage.

With respect to *properties of garbage*, the great majority of the participants said garbage was recycled during the pre-interview, but all of them said garbage was not recycled in the post-interview. Moreover, all of the children were aware of and could explain reasonably well what happened to non-recycled items. Some (n=3) also outlined the process garbage went through after it reached a dumping ground, including such processes as burning and burying.

The children's suggestions for how to reduce garbage and their explanations regarding the reason(s) for their suggestions also differed between the pre- and post-interviews. In the pre-interview, some children (n=10) had no ideas of how to reduce garbage and so their reasoning did not fall under any of the categories. The definitions of waste and garbage were also confused, which meant the children could not reasonably explain how to recycle and how recycling resulted in less garbage. In the post-interview, however, 22 children suggested "recycle and composting, reduce and reuse" as a way to decrease the amount of garbage. Several children (n=9) actually suggested this during the pre-interview, but none could explain how recycling, reusing materials and reduce/reducing consumption worked with any detail, nor could they give any examples of these processes. In the post-interview, the children were able to present alternative ways of reducing garbage and were more conscious of how to reduce, reuse, and recycle. Moreover, they were more aware of the effect of their behaviors on the environment in both the short term and the long term, and so could explain the reasons for their suggestions more logically. In addition, they realized that it was vital to reduce garbage in order to keep the environment clean.

After analyzing the outcomes of the pre- and post-interviews relating to *recycling and packaging waste*, it was observed that while in the pre-interviews the great majority of the participants (n=19) recognized the recycling symbol, they generally could not explain its meaning, nor could they specify where they saw the symbol before. They had some knowledge about recycling but not enough to use it in daily life, since most of them (n=14) did not associate the recycling symbol shown to them in the pre-interviews with those they previously saw on recycle bins at their

school or on product packaging. On the other hand, all of the participants recognized the recycling symbol, stated its meaning and named at least one place where they saw it in the post-interview, especially “on a recycle bin”, “on packaging”, “on the recycling truck” or in a video or book they had seen during the 3R implementation.

When the children’s pre- and post-interview responses were compared, it was clear that the great majority (n=21) did not initially know of the existence recycling bins in their surroundings, and knew much less about which materials went in them. Generally, they confused the recycle bin with the garbage bin, showing they had seldom if ever used recycle bins. After the implementation, however, the participants’ responses in the post-interview demonstrated that all the children not only were aware of where recycle bins were found within their surroundings, but could also distinguish easily between garbage and recycle bins on the basis of the recycling symbol being printed on the latter. They were also more conscious of which materials should be put into them. The fact that they could describe the precise locations of the recycle bins, even the ones that were not near their homes, revealed that they had the ability to, and in many cases began to use recycle bins regularly.

The results of the pre- and post-interviews also indicated that a minority of the participants were able to identify all the types of packaging waste, namely paper, plastic, glass and metal through the photographs shown to them during the pre-interview. It was especially difficult for them to identify metal. Although most of them (n=10) named stated packaging waste as something to be recycled, they could not give specific example(s) of what these materials could be recycled into. Many presumed it was reverted to its former shape. They were, however, somewhat more knowledgeable about paper and plastic. Some (n=5) conflated recycling and reuse. On the other hand, after the implementation, all of the children recognized paper, plastic, glass and metal from the photographs, and all could give clear examples of which materials were recycled into what (such as boxes, pipes, jars, frames, tables, etc.), and could specify where they learned this information. The most significant among these was a video shown to the class, and indeed several students cited material directly from the video. As a result of one further comparison between the



pre- and post-interviews, it was revealed that before the implementation, a great majority (n=23) of the children had insufficient knowledge about the recycling process of packaging waste. Few participants (n=3) were aware of many aspects of the process; however, they also conflated notions such as garbage, waste, garbage bin, recycle bin, etc. Some of them (n=3) also believed they could recycle packaging waste by gluing it together. Several of them (n=3) believed it could become recycled on its own in a recycle bin or any other place. And several (n=2) also thought that recycling was the process of cleaning materials so they would be ready to be used again. On the other hand, after the implementation, all participants could explain the process in detail. The children were aware that this process began with disposing of waste in a recycling bin and could explain the process through the point at which new materials were formed. Much of their explanations of this process (n=21) were based on things they had seen in videos, field trips and discussions from the implementation. They started to realize that the action of disposing of waste in a recycle bin was connected to its conversion into new products.

Before the implementation, the children's pre-interviews suggested that most of them (n=16) could not articulate what to do with recyclable packaging waste, in part because they conflated the concepts of garbage, waste, garbage bins, recycle bins, etc. Some of them (n=5) had no idea, and so gave answers that did not fall under any relevant category, such as making a recycling machine, taking waste far away and giving it to someone who knows how to recycle it. Some participants (n=9) suggested disposing of packaging waste in recycle bins before the implementation, but they mostly (n=20) did not consider the environmental consequences of this action, suggesting they did not realize its importance. In the post-interviews, however, all of the children were more aware that this was an important step for initiating the process of recycling packaging waste. The post-interview results also showed that the children became more conscious of how to recycle, where packaging waste went, and which processes the waste underwent in order to be converted into new products. Moreover, they understood the short- and long-term impacts of their behavior on the environment, as evidenced by the fact that the great majority of them

listed “environmental consequences” as a reason for their answer. They additionally presented alternative suggestions, such as reusing items and reduce/reducing consumption.

Finally, the pre-interviews on the topic of organic waste and compost revealed that before participating in the implementation, 23 of the children were unaware of the existence of organic waste and compost. They perceived fruit peels and vegetables to be garbage because they were not considered necessary, beneficial (for lack of nutrients) or otherwise useful. Neither were they conscious of the benefits and significance of composting, and as a result gave explanations for their answers in the pre-interview that did not correlate with any relevant category. For example, “it becomes messy and we will fall unless we dispose of them in recycle bin” and “peels do not contain vitamins and thus we dispose of them in the garbage” etc. After the implementation, however, all participants knew what organic waste and compost were; and were also more conscious of how to convert organic waste into compost. They were additionally aware of the role of animals during the conversion process, especially worms, and of what purpose(s) compost served. They became careful observers of changes in organic waste and the animals in it throughout the composting process. In addition, two of them also perceived composting as a way to convert things we cannot eat into something beneficial for living things and for the environment.

In conclusion, the overall findings that were obtained from three different sources, namely children, parents and the teacher indicated that this 3R implementation influenced not only the children’s eco-management and persuasion behaviors relating to the 3Rs, including composting, but also its precursors, such as environmental knowledge (knowledge of ecological concepts, knowledge of environmental problems and issues, knowledge of environmental action strategies), perceived skills for using environmental action, personal investment, environmental attitude and intention to act.

## CHAPTER V

### DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

This chapter presents discussion, implications and recommendations of the findings obtained in the present study. The chapter begins with the discussion of the findings in terms of their consistency with national and international studies, followed by the implications and recommendations for practice and further research.

#### 5.1 Discussion

The aim of the present study was three-fold: (a) to examine the influence of a six-week 3R implementation on kindergarten children's eco-management and persuasion behaviors within both home and school environments, (b) to determine whether precursors of these behaviors were affected by the implementation and (c) to investigate the influence of the 3R implementation on parents' and teacher's views and its reflections on their home environments.

##### **5.1.1 Kindergarten children's eco-management and persuasion behaviors and their precursors related to the 3Rs**

In this section, a general picture of the change in kindergarten children's behaviors pertaining to the 3Rs within both the home and school environments, and the precursors of these behaviors are presented.

Overall, the findings revealed that a six-week 3R implementation positively influenced kindergarten children's both eco-management, (i.e. recycling, reusing, reducing, and composting) and persuasion behaviors, (i.e. informing, demonstrating, doing, guiding, warning and encouraging others about recycling, reusing, reducing and making compost) within not only school but also home environments. These findings were further supported by the data obtained from parents and the teacher.

For instance, at home, children began to recycle and to check whether their parents disposed of the recyclables into the recycle bin or not. When children saw their parents disposing of the recyclables into the garbage bin, they immediately warned them and started to explain the importance of recycling for their environment. As far as school environment is concerned, children started to recycle and to follow whether their peers put recyclables into the correct recycle bin. If they realized that their peers put recyclables in an incorrect place or in a garbage bin, they warned their peers to put them into the correct recycle bins found in the classroom.

These findings could be partly attributed to the fact that the 3R implementation produced positive changes in children's behavior through enhancing their environmental knowledge and awareness level. Prior to the 3R implementation, a great majority of children were not knowledgeable and held misconceptions regarding many concepts associated with recycling, such as garbage, packaging waste, organic waste, difference between recyclables and non-recyclables, and composting. In particular, they had superficial and fictitious ideas about how materials were recycled, which people, institutions and organizations in the recycling process were involved and what could be done with recyclable waste. In addition, they had almost no idea about how to *reuse* and *reduce*. Accordingly, they were completely unaware of the positive or negative consequences of their behaviors on the environment. What's more, children mostly thought that recycling was the duty of "the bin man" or "the recycling people", but not their responsibility.

After the 3R implementation, however, all children gained in-depth understanding of how materials were recycled, how garbage and waste were separated and removed, and who participated in such processes. They also gained awareness of the possible consequences of recycling/reducing/reusing. The change in children's environmental knowledge and awareness was provided by means of various open and learner-centered teaching methods, which supported children's active involvement and their environmental learning to take place in holistic, multi-faceted, engaging and meaningful ways. Implementation also provided the children with opportunities to develop their science process skills as well as fundamental

skills in cooperating, collaborating, communicating their thoughts and ideas, stating their own views and listening to others' views. For instance, they started to share with each other their experiences, such as growing plants, feeding animals and making compost. The reason for this is that they had the chance to dramatize, to make role-play and to express themselves in a creative way after the activities e.g. storytelling and watching a video, and thus, they could internalize the learning process. For example, creative drama provided the children with a meaningful context through which they could extend their knowledge and ideas about the environment and environmental issues. Throughout the creative drama process, they could explore a range of views and values about the environment and environmental issues while dramatizing the events, tensions, problems and solutions in the stories. In other words, creative drama promoted the children to engage in learning, to generate a personal reconstruction of knowledge and thus, to gain a more complete and more meaningful understanding. Moreover, children became careful observers of their current environment and its components and provided detailed information about them. For instance, they realized why plants wilted or when plants blossomed and the place where the insects and worms lived. They explicated the events that happened in the current environment by giving importance to cause-effect relationships. In other words, they were aware of which consequences emerged as a consequence of which event(s) and their effect on living things and human beings because they had an opportunity to observe and to draw the changes (such as reproducing worms, rotting apple) occurring during the composting process while moisturizing and mixing the compost.

In addition, all children knew the recycling symbol and they could distinguish garbage and waste according to the symbol. They also became aware of different types of packaging waste, namely paper, plastic, glass and metal and gained detailed knowledge about each step of the actual recycling process, reusing (reusing plastic/glass bottles) and reducing (reducing consumption of napkins and wet wipes). They also realized the development in themselves in terms of environmental knowledge since some of them emphasized that they were more knowledgeable than their

siblings and/or peers owing to their participation in the 3R implementation. What's more, it was observed that children's understanding of the environment, current environment and their components became more comprehensive. For example, they provided more comprehensive examples of components of the environment, in particular biotic factors, such as worms, insects, spider, tulip, and dahlia. Children started to use terms, such as habitat, recycle, garbage, waste, compost, garbage bin, recycle bin, pollution and cleanliness, which mostly emerged in their explanations since the 3R implementation provided them with opportunities for greater involvement with the help of various activities, such as creative drama, storytelling, field trip, making compost, constructing recycle bins for class. Moreover, this type of instruction gave children more chances to gain insights, intrinsic interest, and self-efficacy, and thus, they could focus on learning, understanding, and mastering the task. Furthermore, they provided examples of their behaviors and impacts of these behaviors on the environment. In other words, they became aware of the influence of behaving in an environmentally friendly manner on the environment and its components (biotic and abiotic factors).

In brief, the 3R implementation providing a range of hands-on and minds-on activities helped children to eliminate the gap in their prior knowledge as well as their misconceptions and to facilitate children's understanding and encourage their conceptual restructuring. These activities created such an active learning environment that all children could find equal opportunity to have first-hand experience, share their ideas, engage in pre-and post-drama discussions as well as follow-up tasks and interact with their peers and the researcher throughout the implementation process. In addition, children participated in various activities promoting their active involvement, sharing as well as social interaction between both teacher-children and children-children. Besides, children had a chance to construct and develop their knowledge, understanding and views related to the 3Rs, including composting, with direct experience of 'living through' drama (O'Neill, 1995). Similarly, Palmer (1995) and Palmer, Grodzinska- Jurczak, and Suggate (2003) also emphasized that 4-to-6-year old children could understand complex

issues, i.e. waste and waste management, and they could become more aware and concerned about these issues when they participated in a carefully structured and holistic educational program on waste management in terms of school curricula, educational materials and teacher preparedness. The interviews held with the parents and the teacher also yielded data that confirmed these findings. To illustrate, all parents as well as the teacher stated that children could recognize the recycling symbol and started to look for the symbol of recycling on the packages before deciding whether they were to be disposed of in the garbage bin or recycle bin. In other words, they could distinguish between garbage and waste. Some children requested their parents to reuse plastic bottles. Parents also stated that children were aware of the importance of recycling, reducing and reusing. These findings clearly demonstrated that the 3Rs had started to become part of children's everyday life.

To conclude, the developments in environmental knowledge and understanding might lead all children at school and almost all children at home to exhibit eco-management and persuasion behavior as part of environmentally responsible behavior. It could be inferred that the six-week 3R implementation, which promoted active, participative learning and a unique way of working within the dramatic context allowed children to improve their environmental knowledge and, in turn, their behaviors necessary for active citizenship.

The results of the present study were also somewhat consistent with the findings of the studies related to environmental education/education for sustainable development conducted with preschoolers. For instance, the studies conducted by Apanometritaki (1995) and Lee and Ma (2006) found that preschool children's environmental knowledge and behavior were influenced positively after they participated in an environmental educational program pertaining to recycling either directly or indirectly. The qualitative research carried out by Prince (2011) to investigate the impact of a two-week integrated curriculum derived from preschool children's environmental interests, and to analyze the influence of a participatory action research related to in-depth examination and learning of their interests on children, their parents and teachers. The findings of this study also highlighted that

subsequent to educational practices, children started to comprehend the concept of environment and sustainable living, which led to a transformation in their learning of the concept of environment and sustainable living. As shown in the present study, when younger children were affected by their experiences in the class, such as getting involved in discussions on environmental issues and participating in planning teaching activities related to environmental issues and concepts in some situations like understanding of chains of cause, effect and consequences, reduce waste, recycle, they could demonstrate better understanding of environment and environmental issues (Littledyke, 2004). Accordingly, Littledyke stressed that a scientific educational process can be designed to enable children not only to establish the relationship among social, environmental and moral consequences of environmental issues but also to understand the key factors of these aspects to raise children as adults struggling to prevent environmental problems intensively in the future. Given that, the existing education system generally enables only children to be knowledgeable about important environmental problems such as air pollution, litter and waste. In other words, the effective time that children spent in pre-school education was more significantly associated with children's understanding of the ecological concepts, such as environmental protection, noise, waste and preservation of nature (Paprotna, 1999). Paprotna also pointed out that the scope of the pre-school education related to children's immediate environment and everyday life experiences had an impact on children's environmental understanding. Similarly, as stated by Lewis, Mansfield and Baudains (2010), after children got actively and effectively involved in the learning experience related to sustainability, they could also comprehend and utter their progress with regard to environmental knowledge, attitudes toward local environmental issues and behavioral intentions and actions to improve their environment. In addition, their perceptions of how natural ecosystems function healthily was promoted after the learning experience.

The outcomes of the current study were also similar to the studies conducted with elder participants. For example, studying with 11-to-13-year-old students, Grodzinska-Jurczak, Bartosiewicz, Twardowska and Ballantyne (2003) found that a



four-month school waste education program, which was comprised of four parts, namely waste generation, waste management, waste management decision-makers and public effect upon municipal waste management, improved students' knowledge and awareness of municipal waste. In this study, during the education process, researchers utilized various teaching methods, such as brain storming, discussion, group work, visit to a local landfill site, meeting with local authorities and role playing to meet the requirements of particular teaching/learning environments. It was also reported by Hopper & Nielsen (1991) that experimental intervention programs, such as block-leader program, promoting and information strategies led to an increase in the development of recycling behavior.

The findings of the current research were also supported by the results of several studies which found that specific knowledge about recycling and composting was the strongest predictor of recycling and composting behavior (Ebreo & Vining, 2000; Edgerton, McKechnie & Dunleavy, 2009; Gamba & Oskamp, 1994; Hornik et al., 1995; Prestin & Pearce, 2010; Vining & Ebreo, 1990). For instance, in an early study, Vining and Ebreo (1990) found that recyclers were more aware of recycling and the means for recycling these materials, and more knowledgeable about materials that were recyclable than non-recyclers. In another study by Ebreo and Vining (2000), participants of the study stated that they desired and needed to be more knowledgeable about the benefits of recycling and logic of recycling (such as which materials are and are not recyclable) and solid waste. In a recent study, Prestin and Pearce (2010) pointed out that the lack of knowledge regarding the distinction between recyclable and non-recyclable materials was a major obstacle in terms of recycling behavior. According to Edgerton, McKechnie and Dunleavy (2009), one of the most important predictors of composting was being knowledgeable about composting since such information enabled individuals to develop problem solving skills about the difficulties experienced in the composting process. For this study, it was advised that the knowledge level could be increased via utilizing "telephone help lines", "question and answer leaflets", "information fact sheets", and "Internet-based

resources”. In short, environmental knowledge emerged as one of the significant precursors or reasons of children’s eco-management and persuasion behaviors.

Children’s *personal investment* was found to be another underlying reason or precursor of each behavior both within the home and school environments. The alteration of “personal investment”, as a crucial factor in the ownership variables category, may cause children’s behavior to change since the variable, personal investment, may share a synergistic relationship with the intention to act. It is explained that if an individual identified him/herself strongly with the environmental issue, s/he has a personal interest in it (Chen & Tung, 2010; Davies, Foxall & Pallister, 2002; Hopper & Nielsen, 1991; Hungerford & Volk, 1990; Monroe, 2003; Tonglet, Phillips & Read, 2004). As claimed by Hungerford and Volk (1990), the personal interest can be derived from economic consequences or environmental consequences or both of them. For example, a person who thoroughly understands the economic value of recycling and who uses recycling materials abundantly, might feel that s/he makes a contribution to his/her personal economic investment in recycling (Hungerford & Volk, 1990). On the one hand, if an individual has good ecological concepts about waste disposal and biodegradability and understands the importance of the human involvement in recycling/reusing/ reducing/composting, these might become a strong need for him/her and this could be converted to environmental consequences, one of the categories of personal investment (Hungerford & Volk, 1990). In the current study, the personal interest seemed to be derived mainly from environmental consequences rather than economic consequences. This finding is not surprising as far as participants’ ages/developmental levels are considered. In the present study, when the reasons for their eco-management behaviors were asked after the 3R implementation, almost all children mentioned short-term but mainly long-term environmental consequences, which motivated them to do recycling and/or reusing and/or reducing and/or making compost. For example, some of them highlighted the significance of separating waste from garbage. They acknowledged that if they were mixed, the structure of waste would get damaged. They also added that in this case waste could not be converted

into new materials because of the damage. What's more they stated, "even if the materials are waste, they also lead to environmental pollution unless we do recycling/reducing/reusing". Thus, they tried to be careful in disposing of them separately. Besides, the findings strongly suggested that the children understood recycling to be a third option after "reducing" and "reusing". In other words, they tried to reduce the amount of waste going into landfill sites and recycling plants at the source. Furthermore, several children mentioned making compost as a way to convert the things that we cannot consume anymore to something beneficial for living things and the environment. On the other hand, only few children touched on economic consequences of the 3Rs and composting. For instance, children stated that if they did not recycle waste packages, they had to spend too much money on buying new ones unnecessarily.

In the current study, the positive change in children's personal investment can be attributed to the nature of the activities, which encourage active participation throughout the implementation. During storytelling, children were faced with a number of challenging, unfamiliar situations calling for carefully considered responses. Moreover, during the creative drama activity, for example, they were fully engaged and actively involved in the learning experience throughout role playing and dramatization of the story. To illustrate, being inspired by the dramatization of the tale, several children explained and discussed why they did recycling and the probable consequences of not doing recycling in the present study. By imitating the characters of the tale, they further elucidated the reasons and the possible consequences of not doing recycling on environment and environmental components, i.e. living things. As stated by Hugerat, Eliyn and Zadik (2005), storytelling activities encouraged especially early childhood children's curiosity and led them to think in a more complex and reasonable manner. The studies related to creative drama and storytelling in early childhood education also found that children's interest and motivation regarding scientific issues were promoted by stimulating children's participation in the learning process (Alici & Olgan, 2011; Begoray & Stinner, 2005; Christidou, Kazela, Kakana & Valakosta, 2009). Hopper and Nielsen (1991) also

highlighted that personal norm could be translated into behavior only when level of awareness of environmental consequences was high. According to them, individuals should be informed more thoroughly about the consequences of recycling. Moreover, several studies emphasized that perceptions of consequences of recycling positively influenced individuals' recycling intentions and, thus, their behaviors (Chen & Tung, 2010; Davies, Foxall & Pallister, 2002; Tonglet, Phillips & Read, 2004). Therefore, as advised by Chen and Tung (2010), the government could organize communication programs such as advertising campaigns, and activities on recycling resources and related educational work including children. Given that, individuals could be promoted to exhibit recycling behaviors by understanding their behaviors' perceived consequences i.e. the positive impact of recycling on not only the environment but also themselves.

The current findings also indicated a negative influence of *situational factors such as economic constraints, social pressure, opportunities and barriers* on children's eco-management and persuasion behaviors, counteracting or strengthening the eco- management and persuasion behaviors and their precursors (Hines et al., 1986/87; Kollymuss & Agyeman, 2002). Before the implementation, some children identified lack of recycle bins, lack of support from elders, and elder's negative views regarding children's capabilities or skills as situational factors which prevented them from recycling. However, after the implementation, all children started to recycle at school due to the availability of recycle bins in their class which were made from cardboards by children. Throughout the implementation, recycle bins were placed in the class and children were encouraged to do recycling by using recycle bins not only in class but also at school by means of various activities, including games. In this way, existing counteracting variables were completely eliminated from the school environment.

Meanwhile, at home, some children attempted to eliminate, for example, the problem of the unavailability of a recycle bin by using various strategies that they were exposed to during the implementation, including constructing their own recycling bins, or putting recyclables in a separate bin. Others who did not recycle at

home tried to reuse and/or reduce the waste packages and garbage owing to the harmful effect of garbage and waste on the environment. Thus, they gained necessary cognitive skills such as analyzing, synthesizing and evaluating knowledge about the issue which enabled them to find solutions on the basis of evidence and personal values since their science process skills were supported throughout the implementation.

However, after the 3R implementation, some of the situational factors i.e. lack of parent support, and parents' unfavorable attitude remained as obstacles. For instance, some children reported that they could not do recycling at home due to the insufficient support supplied by their families. In fact, parents, during the interviews, admitted that they did not support and consider their children's efforts in doing recycling at home. Parents, on the other hand, complained about lack of recycle bins and ineffective implementation strategies arranged by municipalities as situational factors, which can be solved by regulations introduced by especially local governments. The findings of the study conducted by Amuteny et al. (2009) also pointed out that the availability of recycle bins and the policy related to waste management increased the recycling rate. In addition, Martin, Williams and Clark (2006) found that 80% of the householders recycle only paper because of lack of a local recycling unit.

As far as composting was considered, the situation was quite different. Before the 3R implementation, no clear responses were received from the participants regarding their composting behavior due to the lack of prior knowledge about organic waste. As stated by Edgerton, McKechnie and Dunleavy (2009), having knowledge about composting was one of the most significant precursors of composting given that this predictor supported individuals to gain problem solving skills about the adversities experienced during the composting process. However, after the implementation, children did not mention the existence of any situational factors hindering making compost at school. Given that, during the implementation they found an opportunity to participate actively in the compost making process both in class and in the school garden.

On the other hand, after the implementation, a great majority of the children claimed that they could not make compost at home due to the presence of some situational factors, like lack of garden and parental support. This outcome was also supported by the data obtained from the interviews held with the parents; most of the parents stated that they lived in an apartment with small or no garden, and thus, they had no chance of making compost even if their children wanted to do so. In addition, parents asserted that there were no bins allocated for organic waste and no implementation that was carried out by municipalities in Ankara. As mentioned earlier by Taylor and Todd (1995), resource-facilitating conditions were one of the main obstacles of composting. Dahlén and Lagerkvist (2010), who investigated the possible influences of applications on both recycling and composting rates in their study, ranged the items from most effective to least as follows: a) property close collection vs. drop-off systems, b) number and types of recycling materials collected separately, c) mandatory vs. voluntary programs, d) economic incentives, e) difference in information strategies, f) residential structure, g) socio economic differences and h) households with private composting and availability for alternative places of discharge. In the light of the analyses of the interviews, it was observed that the findings of Dahlén and Lagerkvist's study were also valid for the present study.

In brief, after the implementation, the negative effect of situational factors on children's eco-management and persuasion at school disappeared, whereas the negative impact of this variable on their behaviors at home, especially those related with making compost, endured. To minimize the influence of this variable and increase the accessibility to recycling opportunities, it is necessary to embark on extensive projects and campaigns, and educational programs with the involvement of children and elders under the support of governments, local governments, local organizations and NGOs (Chen & Tung, 2010; Ebreo & Vining, 2000; Erdogan, 2009; Gamba & Oskamp, 1994). For instance, Erdogan (2009) proposed that municipalities should collaborate with schools to construct projects related to the

accumulation of students' old and used materials, such as books and clothes to promote students' saving and reuse behaviors.

In the present study, it was also seen that the children's attitudes were positively influenced by the 3R implementation. In particular, the parents' and the teacher's observations about the changes in the children made a significant contribution to this finding. For instance, parents generally stated that before the implementation, their children ignored recycling and/or reducing waste and garbage and/or reusing garbage and waste, but after the implementation, their interest and motivation increased to a great extent that they focused on how they could do recycling and/or reusing waste and garbage and/or reducing garbage and waste. Moreover, most children also indicated their willingness in feeding animals and/or growing plants. Furthermore, the teacher stated that during making compost not only in class but also in the school garden, children always followed up the moisturisation and mixture periods of compost and changes in the compost eagerly. She also added that children had started to be careful about collecting biodegradables in a different place from recyclables and garbage. In other words, the children who developed a positive environmental attitude, through actively participating in the learning process via hands-on and minds-on activities, tended to demonstrate more eco-management and persuasion behaviors. What's more, getting children involved in creative drama "allows children to rehearse and develop the skills and attitudes they will need for active citizenship in a safe and non-threatening situation" (McNaughton, 2004, p.152). For instance, during the role playing and dramatization process, children thought about and acted out what they would do if they were the living things that had to live in the environment polluted with waste and garbage. In addition, they proposed solutions to keep the environment clean as if they were living things. According to Hines et al., (1986/87) attitude was a precursor of environmentally responsible behavior by affecting the intention to act. While some studies (Chan, 1996; Chu et al., 2007; Edgerton, McKechnie & Dunleavy, 2009; Ewing, 2001; Tekkaya, Kılıc & Sahin, 2011) fostered the correlation between behavior and attitude, few studies did not (Evans et al., 2007). For example, Evans et al., (2007)

found that 6- to 8-year-old children had a moderately high level of environmental attitude and were inclined to behave in an ecologically responsible way. However, in this study, there was no relationship between young children's environmental attitudes and behaviors even though those of their parents were significant and positive. Moreover, when the researchers investigated the effect of a one-week nature camp on children, they observed that while the camp influenced children's environmental attitudes positively, it had no impact on their behaviors. The authors believed that the reason for this could be derived from the duration of the camp. Thus, more comprehensive and/or longer environmental education could enable children to have more experience that affected both their behaviors and attitudes positively (Evans et al., 2007). The positive impact of first-hand experiences and outdoor teaching activities on children's environmental attitudes were also supported by Owens (2004). In addition, a study with pre-kindergarten through third-grade teachers and children revealed that the attitudes of both teachers and children toward the environment improved after the implementation of a project related with natural history (Basile and White 2000). Turkish researchers also reached similar conclusions. For instance, Erten (2003) implemented lesson plans in which a whole week was devoted to garbage reduction to identify elementary students' knowledge, attitude and behavior about garbage reduction and whether there was a relationship among these variables. In this study, while implementing the lesson plans, various activities such as drawings, composting, and field trip to a landfill were conducted. After the implementation, Erten found that students' attitudes and interests related with environmental protection increased and converted to behavior. Furthermore, an experimental study with elementary students was conducted by Yıldırım (2008) to examine the effect of a four-week environmental education lesson based on environmental problems on students' attitudes toward the environment. Throughout the education process, Yıldırım utilized a student-centred teaching method utilizing discussion, role playing and cooperative learning. After the education, the results of this study revealed that environmental education lesson had a positive impact on students' environmental attitudes.



Lastly, *although internal locus of control, environmental responsibility and the intention to act identified as significant variables of environmentally responsible behavior (Hines et al., 1986/87), they are rarely observed in children as a result of the 3R implementation.*

*Concerning locus of control (LOC), a few children believed that their parents helped them to make compost when they wanted or taught them how to make compost. However, they could not make compost because of situational factors such as lack of facilities that had a direct effect on eco-management and persuasion behaviors independent of other variables. Therefore, it can be stated that while some children had internal locus of control, the influence of this variable on eco-management and persuasion behaviors might not be observed. For instance, while interviewing the children, they stated that they would be able to make compost at their home when they informed their parents of how to make it. On the other hand, during the interview with these children's parents, the parents stated that they could not make compost because of not having a garden. Hence, in the present study, as stated by Hines et.al. (1986/87) in their environmentally responsible behavior model, situational factor had a direct effect on environmentally responsible behavior, and on its categories such as eco-management and persuasion behaviors.*

*While personal responsibility appeared as a reason for doing recycling and disposing of recyclables into the garbage bin before the implementation, after the implementation, this variable disappeared. Before the implementation, several children stated that they were doing recycling and disposing of garbage into the garbage bin to become a nice person. However, after the implementation, their understanding of personal responsibility changed to a sense of obligation toward the environment as a whole or only as a solution to environmental problems. In other words, personal responsibility converted to personal investment-environmental consequences variable after the implementation. For instance, before the implementation, during the interview a child stated that s/he did recycling because s/he was a good person. Yet, after the implementation, the child explained the reason of doing recycling in the following way: "the whole world will be polluted and the*

living things will be affected negatively from this situation unless we do recycling”. The transformation of environmental responsibility to personal investment occurred since after children were involved in activities related to the 3Rs, including composting, children had sufficient knowledge to consider their behaviors’ short-term and long-term environmental consequences and to encourage them to recycle and/or reduce and/or reuse and/or make compost. In other words, as stated by Littledyke (2004), if younger children got involved in planned teaching activities regarding environmental issues and concepts, they could “develop reasoning and understand of the issues that enables older and higher-ability younger children to justify environmental action in the context of what is socially and environmentally desirable” (p.227).

*Even though intention to act* was one of the empowerment variables that was important for the training of responsible citizens in environmental education (Hungerford & Volk, 1990) it seldom appeared after the implementation. A few children, especially those who did not do recycling at home said, “I will start to do recycling today” or “I will start to separate garbage and waste today”. However, in the light of the analysis of the data obtained from the interviews held with parents their intention could not transform into eco-management and persuasion behaviors. The reason for this can be attributed to situational factors. The finding was also confirmed via the environmentally responsible behavior model developed by Hines et al., (1986/87). Thus, as can be observed in their model, situational factor has a direct influence on environmentally responsible behavior independent of the other variables.

### **5.1.2 The parents’ and teacher’s reflections of the 3R implementation**

It was found that the six-week 3R implementation had an impact not only on the kindergarten children’s perceptions toward the environment but also on those of their parents and their teacher; in addition, it had reflections on their home environments.

As far as the home environment was concerned, a great majority of the parents mentioned the alterations not only in their own behavior, environmental knowledge and level of consciousness but also in their child's siblings' behavior, knowledge, as well as attitude towards the 3Rs. The change in the home environment can be partly attributed to parent involvement in activities provided by intergenerational activities such as assignments and project. Thus, mutual learning opportunities and interactive experiences emerged during the intergenerational activities. For example, throughout the assignments related to collecting recyclables and biodegradables in their home environments, children and their parents worked together for a common aim. This collaborative work necessitated a reciprocal intergenerational interaction, such as talking about/discussing (the importance of) recycling and composting, occurred between children and parents owing to their active participation in the process. Likewise, findings of a study carried out by Leeming, Porter, Dwyer, Cobern & Oliver (1997) revealed that children who engaged in classroom practices including pro-environmental activities such as participating in recycling projects, planting plants and writing letters to government officials also affected their parents' pro-environmental behavior positively since the communication, such as talking/discussing about the environment, between children and parents in the home environment increased especially while doing the homework assignments. Moreover, Ballantyne, Fien & Packer (2001a, b) conducted two separate studies to investigate the impact of environmental education programs on students' learning outcomes and intergenerational learning. In these studies, projects, homework assignments, research activities, class presentations were utilized to support family discussions, and thus, intergenerational learning was encouraged as it was in the present study. The results of these studies revealed that via intergenerational activities like assignments and projects, students could do and share their learning and environmental attitude with their parents and they could bring about positive alterations in household practices. What's more, a study conducted by Grodzinska-Jurczak et al. (2003) demonstrated that after a four-month school education program, students frequently started to participate in family discussions at home on various topics, such as separate collection, negative impact of waste upon

the environment, history of waste management, and these discussions led to an alteration in household attitudes and waste practices, such as usage of eco-friendly shopping bags, and buying recyclable products or reusable packages. Similarly, Prince (2011) compared the data obtained from parents' interviews before and after their preschool children participated in sustainability activities derived from children's environmental interest. She observed a change in parents' attitudes towards the environment (i.e. being more respectful toward the environment) and an awareness of sustainability issues (such as starting to do recycling). Thus, their children had reflected the impacts of the activities they were involved in at the school on their parents by talking about them within their home environment. The results of the above-mentioned studies indicated that intergenerational activities, not only designed assignments and projects as in the present study which involved parental participation in the process, but also "spontaneously initiating discussions" as in the studies of Grodzinska-Jurczak et al., and Prince, promoted intergenerational learning. However, in the current study, no change was observed in some households due to the unfavorable attitude and situational factors, such as lack of recycle bins, absence of bins allocated for organic waste and ineffective implementation strategies arranged by municipalities.

On the other hand, after the 3R implementation in the current research, the teacher stated that she had also begun to separate materials, especially glass and plastic, from the garbage at her home. Additionally, she declared that she had the desire and intention to carry out these kinds of practices with her new students in the following semester. This finding was also confirmed by other studies (Grodzinska-Jurczak et al., 2003; Prince, 2011). For example, in a study by Grodzinska-Jurczak et al., (2003), teachers proposed that the issues regarding solid waste management should be integrated into the school curricula at all steps of education and indicated their willingness to teach solid waste issues in their class. According to research conducted by Prince (2011), teachers were found to be positively affected by the educational practices. Moreover, they became more knowledgeable and were much more aware of the sustainability issue.

As a conclusion, it could be stated that the 3R implementation played a crucial role in providing appropriate environments to create alterations in both the school and home environments.

## **5.2 Implications and Recommendations**

In the present study, to promote alteration in children's environmentally responsible behavior, they participated in a six-week 3R implementation. As proposed by NAAEE (2010), during this implementation, various child-centered teaching methods and activities were performed with kindergarten children in order to enable them to be involved in hands-on investigations and to gain direct experiences. The outcome of the present study indicated that the six-week 3R implementation had a significant influence on children's eco-management and persuasion behaviors related to the 3Rs, including composting. Their behaviors were found to be mostly influenced by environmental knowledge, personal investment, situational factors, and environmental attitude as precursors. These findings were also supported by the information obtained from the parents and the teacher. In light of these findings, several implications and recommendations are presented respectively.

### **5.2.1 Implications for educational policy and practice.**

In this part, the contributions of the findings of the present study on curriculum, children, family, teacher and public are presented respectively.

The findings of the current study revealed that creative drama, storytelling, short movies, field trip and composting were effective activities to support the development of children's eco-management and persuasion behaviors, as part of environmentally responsible behavior, and their predictors related to the 3Rs as well as composting. In Turkey, the Early Childhood Education Program was renewed in 2006 (still prevails). It is seen that several changes occurred in the curricula between 2002 and 2006 with respect to the implementation of the curriculum (2006 being more child-centered), and the increase in the integration of the purposes of

environmental education in the curriculum in terms of goals and objectives (Erdogan et al., 2012). Yet, researchers found that only 34 (13%) out of 264 objectives in 2006 were related to any of the components of environmental literacy including environmentally responsible behavior and its predictors. Moreover, authors stated that the majority of the related objectives were associated with environmental knowledge but less with skills, and little with affect and behaviors. For instance, four objectives, namely (a) to efficiently use resources that are necessary for sustaining life efficiently, (b) to take responsibility for feeding and protecting animals, (c) to use his/her belongings both at home and at school in a clean and orderly manner and (d) to keep his/her environment clean are all in line with conversation and eco-management, whereas one objective “to express people’s faults in an appropriate way” is pertinent to interpersonal and public persuasion (Erdogan et al., 2012). Accordingly, there were insufficient goals and objectives regarding eco-management and persuasion behaviors related to the 3Rs. Although knowledge was a crucial component of environmental literacy, it was not enough to understand environmental dynamics and to compose a view to protect the environment (Maleki & Karimzadeh, 2011). Hence, it can be suggested that this program could be renewed and many goals as well as objectives related to not only the 3Rs but also the 7Rs, namely “Reduce, Reuse, Respect, Reflect, Rethink, Recycle and Redistribute” could be added by considering all the components of environmental literacy together within a balance. Even though in Turkey, new early childhood curriculum will be applied beginning with the 2013-2014 academic year, it is seen that the same deficiencies related to the components of environmental literacy in the 2006 curriculum are valid for the new curriculum. Besides, both curriculum developers and textbook authors could design sample activities including creative drama, storytelling, field trip, educational games addressing the 3Rs as well as composting for the educators since school programs and educators are the resources of children’s environmental knowledge (Erdogan & Ok, 2011). Curriculum developers could create appropriate short movies and educational videos related to the 3Rs for early childhood children by utilizing information and communication technologies given that the sources pertaining to environmental education are inadequate to promote the level of

children's environmental understanding, consciousness and awareness (Erdogan et al., 2012).

Furthermore, the present study was conducted at the eco-school. The school had some facilities such as a garden and a recycle bin in the school garden. However, the school environment could provide restricted opportunities to children for active learning and participation in terms of environmental education. Therefore, preschool and kindergarten's learning environments can be constructed by MoNE to encourage children's active participation in various hands-on and minds-on activities and real-life experiences. For instance, schools can be established in a large area with plenty of plants and animals such as horses, sheep, rabbits. In these schools, children can participate in various activities such as feeding animals, growing plants, composting and playing. In this way, nature should be part of children's education and they should also find the opportunity to acquire an education about, in and for the environment (Akçay, 2006). In addition, local projects regarding education for environment/sustainable development should be organized with the participation of parents and societies. Furthermore, field trips to natural settings, such as forests and lakes nearby their school could be organized by the teacher(s). What's more, children, under the guidance of their teachers, should be able to visit zoo(s), natural history museum(s), and recycling center(s) in order to get first-hand experiences. Some international and national projects and campaigns concerning recycling, reusing old materials, reducing consumption, sharing materials (i.e. toys, clothes etc.) with children from different school types such as private schools, eco-schools and non-eco-schools. In addition to these, projects regarding communicating with other cultures in the world and respecting the environment and environmental components such as biotic and abiotic things could be organized to encourage children's contributions to the 7Rs, the dimensions of the three different pillars of sustainable development (OMEP,2011). Moreover, The Ministry of National Education, The Ministry of Environment and Forestry, E-NGOs, and TUBITAK can organize national summer environmental education programs/camps which include activities pertaining to the 7Rs, and younger children from both public and private schools in

different parts of Turkey. In fact, these types of programs are generally conducted with elementary school students or even elder students. Thus, nationwide programs like elder students' programs can be carried out for preschoolers. Additionally, even these institutions can organize and implement various international educational programs/camps with the involvement of not only children but also parents and teachers with the collaboration of international organizations, such as UNICEF and OMEP, to make significant contributions to sustainable development.

Moreover, in the current research, it was observed that several activities such as projects and assignments, related to the 3Rs, including composting, enabled parents to be actively involved and increased the frequency of family discussions regarding the application in the schools via intergenerational learning. Therefore, different kinds of activities such as projects, field trips, homework assignments, class presentations related to sustainable development can be designed to promote parent involvement since parents play a key role in their children's education for environment/ sustainable development and have a positive effect on children's behaviors and attitudes towards environment, especially when children are young. Their impact, however, decreases as children mature (Chu, Shin & Lee, 2006). In other words, children's learning experience begins within their families, and thus, their families have the most significant impact on preschoolers' attitudes, values, behaviors, habits and skills so not only parents, but also siblings, grandparents and other extended family members could be encouraged to attend formal early childhood education programs supported by the above-mentioned activities. If the educational programs are not accessible for family members, non-formal and informal educational programs and seminars can be organized to promote active participation of families in sustainable society (Pramling-Samuelsson & Kaga, 2008).

Even if the required changes in terms of the program are carried out by the government and curriculum developers, the implementing agents, especially teachers, have a significant role in putting into practice the values and the principles of sustainable development involved in. In the present study, the teacher had not implemented comprehensive activities related to the 3Rs, including composting, until



the 3R implementation was conducted. She had no prior experience in how to implement such an educational process in the class. However, after the 3R implementation, she realized the importance of integration of the 3R implementation on children's environmentally responsible behaviors and she decided to conduct a 3R implementation in the following year. Hence, in-service training can be provided both to in-service preschool teachers and school administrators in an attempt to increase their environmental consciousness and awareness of sustainability. In addition, not only theoretical but also practical courses pertaining to environmental education could be provided in preschool teacher education programs to increase pre-service teachers' knowledge and awareness on environmental issues and problems and to develop their perspectives of learning for sustainability (Erten, 2005; Palmer, 1995; Palmer, Grodzinska- Jurczak & Suggate, 2003; Pramling-Samuelsson & Kaga, 2008; UNESCO, 2008; Teksoz, Sahin & Ertepinar, 2010).

What's more, in order to convert the learning outcomes regarding the 3R implementation to everyday life practices, such outcomes should be supported with everyday applications. Yet, in the current research, not only children but also their parents mostly complained about lack of recycle bins, special bins for organic waste and applications which are not carried out and not supported by governments and local governments. To eliminate these obstacles, especially municipalities can increase the number of recycle bins for each waste type such as paper, plastic, glass, metal, organic waste etc. They can place these bins not only in some places in city centers but also on each street corner so that people can reach them easily. Moreover, they can regularly follow up the collecting process of the waste. Furthermore, they can encourage citizens to recycle, reuse and reduce and make compost, and to use recycle bins regularly with various implementation procedures, such as projects, campaigns (similar to wheelchair campaign wherein bottled water companies committed to furnishing a disabled person with a wheelchair for every 1000 bottle caps returned to them), educational programs and seminars etc. Additionally, it is necessary that an "inclusive society" in which all individuals irrespective of their age, gender, socio-economic status and place of residence or capabilities can be

formed to enable individuals to become involved in solving problems and establishing a sustainable future for all living things, habitats, and the world (UNESCO, 2008).

### **5.2.2 Recommendations for further studies.**

Owing to the background properties of children explained in the method chapter, the present study, which is qualitative in nature, including the implementation process, was carried out only with 60-to-72-month-old children (n=24) who were attending a kindergarten at a public elementary eco-school in Ankara, Turkey. The responses gathered from the kindergarten children, parents and the teacher after the implementation produced numerous recommendations. The findings of the present study, which examined the influence of the six-week implementation regarding the 3Rs, including composting, on children in different social environments, namely at home and at school, seemed to provide a strong substructure for further studies, including environmental education implementations in early childhood education. In addition, the present research can become an initial study indicating that effective programs in which various teaching methods and activities are utilized to support eco-management and persuasion behaviors as part of environmentally responsible behavior and their predictors can be established. In order to increase the generalizability of the results, the present study can be replicated with 60-to-72-month and even younger children with different background properties, such as different school types (non-eco schools, private and public kindergartens and/or preschools) and parents and teachers with different characteristics, properties and experiences. Moreover, further studies can be constructed to support much more parent involvement with various activities. Furthermore, experimental studies can be designed by utilizing control groups since use of control groups provides opportunities to examine the effectiveness of implementation process. Besides, this study can be designed as a longitudinal study to identify the effectiveness and permanence of environmental education implementations on children's environmentally responsible behavior in an attempt to

shed light on constructing and integrating environmental education policies in the early childhood education curriculum in Turkey.

In the current study, while planning and applying the six-week 3R implementation, various teaching methods and activities (such as creative drama, field trip, storytelling, intergenerational learning etc.) were integrated into early childhood education to encourage active participation of children. Further studies related to the 3Rs, as well as composting, can be carried out by using different teaching methods and activities to describe and compare the impact of different methods and activities on children's environmental behavior. In addition, in the present study, to assess the influence of the six-week implementation, face to face interviews were used as an alternative assessment method. Future research can be conducted by employing different assessment methods (such as drawings, questionnaires, observation, self-reports, portfolios, checklists...etc.) to examine the effect of environmental education implementations.

It is also vital to convert these findings to an applicable level in early childhood education. To achieve this aim and to inform the people who play a key role in early childhood education about the importance of environmental education and how it could be integrated into early childhood education, comprehensive organizations should be arranged with the involvement of experts in different fields from universities, early childhood teachers, school managers, curriculum planners and pre-service teachers. In addition, these people could be encouraged to implement environmental education in early childhood education since early childhood education plays a key role in providing a basis for active and responsible citizenship.

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## APPENDIX A

### INTERVIEW PROTOCOLS

#### A.1 Interview Questions for Children

##### Çocuklar için Görüşme Soruları

Uygulamadan önce ve sonra olmak üzere iki kez kullanılacaktır.

- 1) Çevre denince ne anlıyorsun? (Sence çevre nedir?)
- 2) Çevremiz nasıl kirlenir?
- 3) Çevre kirliliği denince aklına ne geliyor?
- 4) Şu anda yaşadığın çevreyi anlatır mısın?
- 5) Çöp denince aklına ne geliyor? Sana neleri hatırlatıyor?
- 6) Çöpleri nereye atıyorsun? Neden?
- 7) Evdeki çöplerinizi ne yapıyorsunuz? Neden?
- 8) Okuldaki çöplerinizi ne yapıyorsunuz? Neden?
- 9) Çöpleri azaltmak için ne yapmalıyız? Neden?
- 10) Bu sembolü daha önce gördün mü?



- a) Evet ise, nerede gördün? Anlamı nedir?
- b) Hayır ise bir sonraki soruya geçilir.

- 11) Bu fotoğraflarda neler görüyorsun?



- a) Bunlardan hangisi ya da hangileri geri dönüştürülüyor?
  - b) Bunlar nasıl geri dönüştürülüyor? Hangi maddelere geri dönüşüyor?
  - c) Bunların geri dönüştürülmesi için neler yapmalıyız?
- 12) Çöpler geri dönüştürülüyor mu? Dönüştürülmeyenler ne yapılıyor?  
Nereye gidiyor?
- 13) Evde geri dönüşüm yapıyor musun? Neden?
- 14) Okulda geri dönüşüm yapıyor musun? Neden?
- 15) Okulda en yakın geri dönüşüm kutusu(ları) nerede?
- 16) Oturduğunuz yere yakın geri dönüşüm kutusu(ları) var mı?
- a) Evet ise , evinize en yakın geri dönüşüm kutu(ları)su nerede?
  - b) Hayır ise, soru yok.
- 17) Geri dönüşüm yapmazsak ne olur?
- 18) Bu fotoğraflarda neler görüyorsunuz?





19) Evinizde fotografa gördüklerini ne yapıyorsunuz? Neden?

20) Okulda fotografa gördüklerini ne yapıyorsunuz? Neden? (Uygulamadan sonra sorulacaktır.)

## A.2 Interview Questions for Parents

### Veliler için Görüşme Soruları

Velilerle uygulamadan sonra yapılacak görüşmede kullanılacaktır.

- 1) Cinsiyetiniz?
- 2) Kaç yaşındasınız?
- 3) Gelir düzeyiniz nedir?
- 4) Nasıl bir evde (mustakil mi yoksa apartmanda mı) yaşıyorsunuz?
- 5) Hangi tip aile yapsına (çekirdek aile mi yoksa geniş aile mi) sahipsiniz?
- 6) Eğitim düzeyiniz nedir?
- 7) Mesleğiniz nedir?

Bu uygulamadan sonra,

- 8) Evinizde “azalt”, “tekrar kullan”, “geri kazan” ve “kompost yapımı” ile ilgili herhangi bir değişim oldu mu?
  - a) Evet ise nasıl bir değişiklik oldu? Bu değişikliğin sebebi nedir?
  - b) Hayır ise sebebi nedir?
- 9) Sizde “azalt”, “tekrar kullan”, “geri kazan” ve “kompost yapımı” ile ilgili herhangi bir değişim oldu mu?
  - a) Evet ise nasıl bir değişiklik oldu? Bu değişikliğin sebebi nedir?
  - b) Hayır ise sebebi nedir?
- 10) Çocuğunuzda “azalt”, “tekrar kullan”, “geri kazan” ve “kompost yapımı” ile ilgili herhangi bir değişim oldu mu?
  - a) Evet ise nasıl bir değişiklik oldu? Bu değişikliğin sebebi nedir?
  - b) Hayır ise sebebi nedir?
- 11) Çocuğunuzun “azalt”, “tekrar kullan”, “geri kazan” ve “kompost yapımı” ile ilgili sizin üzerinizde etkisi oldu mu?
  - a) Evet ise nasıl bir etkisi oldu? Bu etkinin sebebi nedir?
  - b) Hayır ise sebebi nedir?
- 12) Çocuğunuzun “azalt”, “tekrar kullan”, “geri kazan” ve “kompost yapımı” ile ilgili varsa kardeş(ler)i üzerinde etkisi oldu mu?

a) Evet ise nasıl bir etkisi oldu? Bu etkinin sebebi nedir?

b) Hayır ise sebebi nedir?

### **A.3 Interview Questions for Teacher**

#### **Öğretmen için Görüşme Soruları**

Öğretmenle uygulamadan sonra yapılacak görüşmede kullanılacaktır.

- 1) Cinsiyetiniz?
- 2) Kaç yaşındasınız?
- 3) Eğitim düzeyiniz nedir?
- 4) Hangi bölümden mezunsunuz?
- 5) Kaç yıldır öğretmenlik yapıyorsunuz?
- 6) Bu uygulamadan önce..... isimli öğrenci geri dönüşüm yapıyor muydu?
- 7) Bu uygulamadan sonra..... isimli öğrencide çevreye yönelik davranışları açısından nasıl değişiklikler gözlediniz?
- 8) Bu uygulamadan sonra..... isimli öğrencinin sınıftaki arkadaşları üzerindeki etkileri ne oldu?
- 9) 2011-2012 eğitim ve öğretim yılında okulunuzda geri dönüşümle ilgili proje yürütüyor musunuz?
  - a) Evet ise kaç tane proje yürütüyorsunuz? Bu projelerin kapsamı nedir? ( sadece okul mu yoksa evi de kapsıyor mu?)
  - b) Hayır ise sebebi nedir?

**APPENDIX B**  
**ETHICAL PERMISSIONS**



1956

Orta Dogu Teknik Üniversitesi  
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23 Ocak 2012

Gönderilen: Yrd. Doç. Dr. Refika Olgan

İlköğretim Bölümü

Gönderen : Prof. Dr. Canan Özgen

IAK Başkan Yardımcısı

İlgi : Etik Onayı

"Okul öncesi çocuklarının geri dönüşüm konusunda çevre dostu davranışlar kazanmasında drama ve alan gezisi etkinliklerinin etkisinin araştırılması" isimli araştırmanız "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

23/01/2012

Prof. Dr. Canan ÖZGEN  
Uygulamalı Etik Araştırma Merkezi  
(UEAM) Başkanı  
ODTÜ 06531 ANKARA

## **Veli Onay Mektubu**

### **Sayın Veliler,**

ODTÜ Eğitim Fakültesi İlköğretim Bölümünde araştıma görevlisiyim. Okul Öncesi Öğretmenliği Ana Bilim Dalı Yüksek lisans programına devam etmekteyim. Yrd. Doç.Dr. Refika OLGAN danışmanlığında yürütölen okul öncesi çocuklarının geri dönüşüm konusunda çevre dostu davranışlar kazanmasında drama ve alan gezisi etkinliklerinin etkisini araştırmakta olduğum Yüksek Lisans Tez çalışmam kapsamında bu etkinliklere katılan okul öncesi çocuklarının geri dönüşüm yapmaya yönelik davranışlarında nasıl bir deęişiklik olduğunu incelemeyi hedeflemekteyim. Bu nedenle, bu formun ve mektubun yollanış amacı çocuęunuzun da çalışmamıza katkıda bulunabilmesi için sizden gerekli iznin alınmasıdır.

Yapılacak olan çalışmanın başlıca amacı 5 yaş çocuklarının katıldıkları drama ve alan gezisi etkinliklerinin geri dönüşüm konusundaki çevre dostu davranışlarını nasıl etkilediğini incelemektir. Bu araştırmada, ayrıca okulun fiziksel özelliklerinin, eğitim ortamının, öğretmen ve anne babaların görüşlerinin çocukların çöp ve atık konusuna ilişkin düşüncelerini nasıl şekillendirdiği de incelenecektir. Ayrıca sosyoekonomik düzeyin ve cinsiyetin çocukların çevre dostu davranışları üzerindeki etkisi de araştırılacaktır.

Çalışma sonucunda elde edilecek bilgiler okul öncesi dönemdeki çocukların katıldıkları drama ve alan gezisi etkinliklerinin çevre dostu davranışlar kazanmalarındaki etkisini görmemizi sağlayacaktır. Bu sayede yapılan değerlendirmeler çocukların çevre eğitimi sürecine katkıda bulunacak ve çevre dostu davranışların erken yaşlarda kazanılması sürecine ışık tutacak ve geleceğin çevre okur yazarı bireyleri olmalarında önemli bir adım olacaktır.

Katılmasına izin verdiğiniz takdirde çocuęunuzla yarı yapılandırılmış görüşme yapılacaktır. Görüşmenin ortalama süresi 30 dakikadır. Veri toplanırken hiçbir şekilde isim ya da aile kimliğini belirleyici sorular sorulmayacaktır. Araştırma sonrasında araştırmacının güvenilir bilgiye ulaşması için araştırma sürecinde ses

kaydı yapılacaktır. Çalışmamız katılımcıların fiziksel veya ruhsal sağlığını tehdit edici ya da onlar için stres kaynağı olabilecek unsurları içermemektedir. Uygulama öncesinde ve sonrasında çocuklarınıza sorulacak soruları incelemeniz mümkün olacaktır.

Katılım sonunda öğrenciler verdikleri bilgilerle, okul öncesi dönemdeki çocukların çevre dostu davranışlar geliştirme sürecine katkıda bulunacağı düşünülmektedir.Çocuklara sorulacak sorular hiçbir şekilde kişisel rahatsızlık verecek olumsuz öğeler içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü çocuğunuz kendisini rahatsız hissederse görüşme sonlandırılacaktır.

Bu çalışmaya dediğiniz destek için şimdiden teşekkür ederim. Araştırmayla ilgili sorularınızı aşağıdaki e-posta adresini veya telefon numarasını kullanarak sorabilirsiniz.

Saygılarımla,

Yüksek Lisans Öğrencisi Arş. Gör. Şule ALICI

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\*\*\*\*\*  
\*\*\*\*\*

***Lütfen bu araştırmaya katılmak konusundaki tercihinizi aşağıdaki seçeneklerden size en uygun gelenin altına imzanızı atarak belirtiniz ve bu formu çocuğunuzla okula geri gönderiniz.***

**A)** Yukarıda açıklamasını okuduğum çalışmaya, oğlum/kızım  
\_\_\_\_\_ 'nin katılımına izin veriyorum. Ebeveynin:

Adı-Soyadı..... İmza

.....

**B)** Yukarıda açıklamasını okuduğum çalışmaya, oğlum/kızım  
\_\_\_\_\_ 'nin katılımına izin vermiyorum. Ebeveynin:

Adı-Soyadı..... İmza

.....



## APPENDIX C

### PERMISSION FROM MINISTRY OF NATIONAL EDUCATION

T.C.  
ANKARA VALİLİĞİ  
Milli Eğitim Müdürlüğü

Bölüm : İstatistik Bölümü  
Sayı : B.08.4.MEM.0.06.20.01-60599/ 16874  
Konu : Araştırma izni  
Şule ALICI

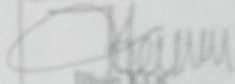
29.02/2012

**ÇANKAYA İLÇE MİLLİ EĞİTİM MÜDÜRLÜĞÜNE**

İlgi: a) M.E.B. Bağlı Okul ve Kurumlarında Yapılacak Araştırma ve Araştırma Desteğine Yönelik İzin ve Uygulama Yönergesi.  
b) MEB EARGED' in araştırma izinlerine ilişkin 11/04/2007 tarih ve 1950 sayılı yazısı.  
c) 09/01/2012 tarih ve 2247 sayılı Valilik Onayı.  
d) Orta Doğu Teknik Üniversitesinin 02/02/2012 tarih ve 1456 sayılı yazısı.

Orta Doğu Teknik Üniversitesi Eğitim Fakültesi yüksek lisans öğrencisi Şule ALICI'nın "Okul öncesi çocuklarının geri dönüşüm konusunda çevre dostu davranışlar kazanmasında drama ve alan gezisi etkinliklerinin etkisinin araştırılması" konulu tezi ile ilgili anketi uygulaması ve kamera çekimi yapması, ek listedeki ilginç okullarında Müdürlüğümüz Değerlendirme Komisyonunca uygun görülmüştür.

Mihirli anket örnekleri (4 sayfadan oluşan) araştırmacıya ulaştırılmış olup, uygulama yapılacak sayıda araştırmacı tarafından çoğaltılarak, araştırmanın ilgi (x) yönerge çerçevesinde gönüllülük esasında giber uygulanmasını rica ederim.

  
İlhan KOC  
Müdür a.  
Şube Müdürü

**EKLER** :  
1-Okul Listesi (1 Sayfa)

29/02/2012 Memur E. KÖNEK  
29/02/2012 Şef N. ÇELENK

İ: Millî Eğitim Müdürlüğü-Beşevler  
İstatistik Bölümü  
Tel: 312 42 17  
istatistik@b06.ankara.meb.gov.tr

**APPENDIX D**  
**SAMPLE PHOTOGRAPS RELATED TO IMPLEMENTATION**



***Figure-1*** The discussion about the photograph related to forest during the creative drama.



***Figure-2*** The examination of the materials with magnifying glasses.



**Figure-3** The process of making compost at the school garden.



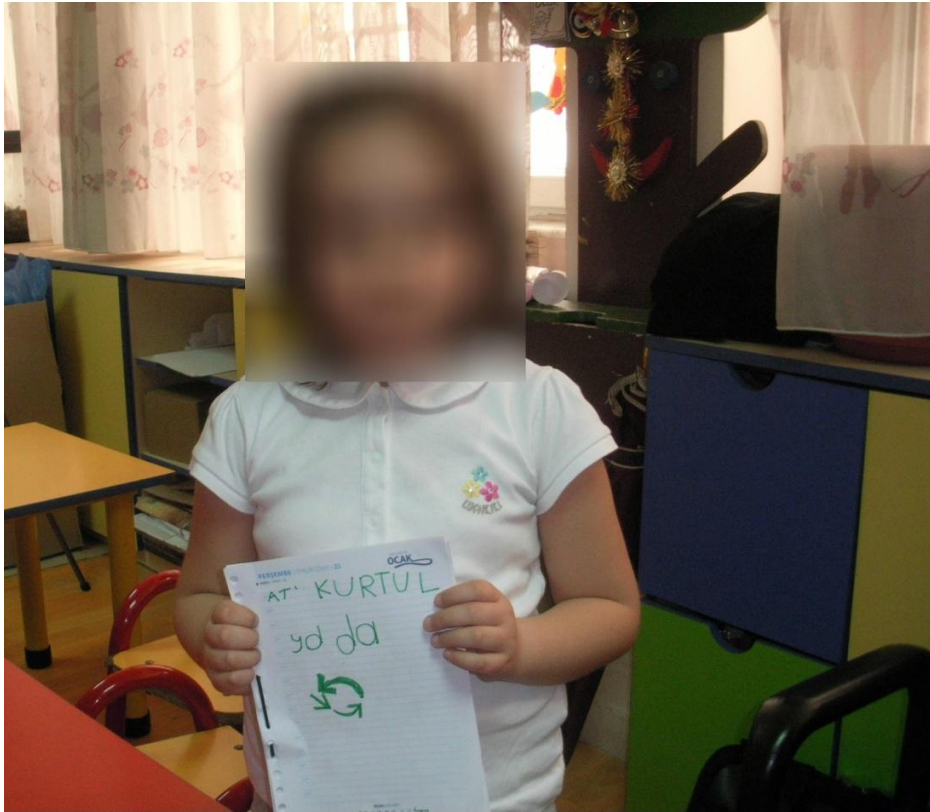
**Figure-4** The role-playing of the tale in creative drama.



**Figure-5** The staff telling about waste during the field trip.



**Figure-6** The instruction of guest speaker.



**Figure-7** A sample project prepared by a child in the group and her parent.



**Figure-8** A sample project prepared by a child in the group and his parent.

**APPENDIX E**  
**TEZ FOTOKOPİSİ İZİN FORMU**

**ENSTİTÜ**

Fen Bilimleri Enstitüsü   
Sosyal Bilimler Enstitüsü   
Uygulamalı Matematik Enstitüsü   
Enformatik Enstitüsü   
Deniz Bilimleri Enstitüsü

**YAZARIN**

Soyadı : Şule

Adı : ALICI

Bölümü : İlköğretim Bölümü, Okul Öncesi Öğrtemenliği

**TEZİN ADI** (İngilizce) : “RECYCLE, REDUCE, REUSE EDUCATION  
FOR KINDERGARTEN CHILDREN”

**TEZİN TÜRÜ** : Yüksek Lisans  Doktora

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir.
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir.
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz.

**TEZİN KÜTÜPHANEYE TESLİM TARİHİ:**