

A COMPARISON OF SELECTED ELEMENTARY CURRICULA IN
REGARD TO AN ACTION BASED ENVIRONMENTAL CURRICULUM
FOR ELEMENTARY SCHOOLS IN TURKEY

A MASTER'S THESIS

by

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A COMPARISON OF SELECTED ELEMENTARY CURRICULA IN
REGARD TO AN ACTION BASED ENVIRONMENTAL CURRICULUM
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May 2012

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Curriculum and Instruction.

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ABSTRACT

A COMPARISON OF SELECTED ELEMENTARY CURRICULA IN REGARD TO AN ACTION BASED ENVIRONMENTAL CURRICULUM FOR ELEMENTARY SCHOOLS IN TURKEY

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May 2012

An action based curriculum aims to enhance the formation and development of the human personality by teaching ecological values, knowledge, attitudes, and skills with respect to environmental issues, their understanding, and commitment to be involved in environmental action. In this thesis, five curricula from selected various countries were analyzed, explored, and compared in order to investigate whether they contained certain objectives, environmental terminology and activities that lead students to take environmental action. Four curricula, Ontario, Canada; England, Britain; Turkey; and International Baccalaureate Primary Years programme (IBPYP), were analyzed and compared to the Environmental Education Curriculum for Middle School from the United Nations Environmental Programme in order to be

able to determine best practices that encourage and teach environmental action. Educators from elementary education and officers from non-governmental environmental organizations were interviewed to determine their opinions on environmental education within Turkey and the basic elements of an action-based curriculum. Curriculum analysis results and the transcription of interviews were used to prepare recommendations for an action-based environmental curriculum that enables students to acquire environmental knowledge, skills and activities that would lead them to action in finding and implementing solutions to environmental problems.

Key words: Environmental education, action, participation, action-based curriculum

ÖZET

TÜRKİYE'DEKİ İLKOKULLARI EYLEM TEMELLİ ÇEVRE MÜFREDATINA DOĞRU GELİŞTİRMEK AMACIYLA SEÇİLMİŞ OLAN MÜFREDATLARIN KARŞILAŞTIRILMASI

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Eylem temelli müfredat, çevreyi korumak amacıyla eyleme geçme isteği, bağlılık ve anlayış gibi çevresel değerleri, bilgiyi, tutumları ve becerileri öğretmek insan kişiliğinin oluşmasına ve gelişmesine yardımcı olmayı amaçlar. Bu yüksek lisans tezinde, çeşitli ülkelerden seçilmiş beş müfredat, çevresel eylemi öğreten ve teşvik eden kazanımları, çevre terminolojisini ve çevresel etkinlikleri içerip içermediklerini belirlemek amacıyla analiz edilmiş ve karşılaştırılmıştır. Ontario, Kanada; İngiltere, Büyük Britanya; Uluslararası Bakalorya İlk Yıllar Programı ve Türk Milli Eğitim müfredatı, analiz edildi ve Birleşmiş Milletler, Orta Okullar için Çevre Eğitimi programı ile çevresel eylemi öğreten ve teşvik eden en iyi uygulamaları bulmak amacıyla karşılaştırıldı. Türk Milli Eğitim müfredatında varolan çevre eğitiminin ve eylem temelli müfredatın temel unsurlarını belirlemek amacıyla, ilkokul eğitiminde uzman olan öğretmenlerle ve sivil toplum örgütleriyle görüşmeler yapıldı. Müfredat

analizi ve görüşme sonuçları kullanılarak, öğrencileri çevresel sorunlara çözüm bulmaya ve bu çözümleri uygulamaya yönlendirecek olan bilgiyi, becerileri ve etkinlikleri onlara kazandırmayı amaçlayan eylem temelli müfredat için öneriler hazırlanmıştır.

Anahtar Kelimeler: Çevre eğitimi, eylem temelli müfredat, eylem, katılım

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CHAPTER 1: INTRODUCTION

The twentieth century was marked by both the recognition and the creation of a host of environmental problems. Our twenty-first century bears the burden of resolving these problems and preventing the emergence of more. It is hard for a society to survive if its natural resources are disappearing and the environment is not protected carefully. One effective solution to environmental issues is making the young population aware that they need to proactively begin to protect the environment they will live in and inherit in the future. Environmental education plays an important role in training young people and their families to become aware of environmental issues and take immediate action to preserve environment (IUCN, 1970).

Today's students are tomorrow's leaders and decision makers. According to Alp, Ertepinar, and Tekkaya (2006) and Erdogan, Marchinowski, and Ok (2009), the Turkish science curriculum should be improved in a way that would enable the students to become aware of environmental issues, understand them and proactively make decisions towards solving these problems and challenges. They need to learn and practice skills to protect and preserve the environmental quality. Environmental education should lead to the acquisition of knowledge, the development of analytical skills, the beginning of environmentally conscious attitudes and ultimately to responsible behaviour (Alp et al., 2006 & Erdogan et al., 2009).

As a result, a science and social studies curriculum in Turkey appears to be limited in enabling students' awareness of environmental issues and their acting towards

protecting the environment. It is thus important to explore different curricula around the world in order to find out effective teaching objectives, activities, and environmental terminology that lead students to action in finding and implementing solutions to environmental problems.

Background

According to ninth eight year development plan, Turkey is experiencing stable economic development and rapid population growth even during the economic crisis that various neighboring countries experiencing (DPT, 2007). The Turkish economy is among the fastest growing economies among the OECD (DPT, 2007). The net effect of these factors is that Turkey's energy demand has grown yearly and is expected to continue growing rapidly (Kaygusuz, 2007). Energy is essential to economic and social development and an improved quality of life in Turkey as well as in other countries. Energy supply infrastructures within Turkey as in many developing countries which are being rapidly expanded as policy-makers and investors around the world increasingly recognize electricity's pivotal role in improving living standards and sustaining economic growth (Kaygusuz, 2007). There is a growing concern that long-run sustainable development may be compromised unless measures are taken to achieve balance between economic, environmental, and social outcomes (IEA, 2005).

There are three specific issues of sustainable development that are of particular importance for Turkey: addressing climate change, reducing air pollution and ensuring sustainable use of natural resources (Kaygusuz, 2007). According to

Kaygusuz (2007) geography, population, and economy are the major reasons related to these specific issues.

After looking at Turkey's energy needs, consumption, and environmental issues a review regarding the Turkish governmental approach to environmental issues and environmental education needs to be modified to influence people's awareness and lead them to take action to preserve the environment.

The Turkish government began to pay serious attention to the environment during the 1960s. For the first time, the term "environment" was mentioned in the 1961 Turkish constitution (Erdogan et al., 2009). About a decade later, the Turkish government approved the first policy pertaining to environmental rights and protection as a part of the Third Five Year Development plan, which covered the years between 1973 and 1977 (Hotinli, 2002). Even though these policies did not seem to have direct impact on the national curriculum, it has affected further developments of environmental awareness and governmental attention to environmental issues. As a result of rapid growth in energy use, industry, transportation, and tourism during the 1990s, Turkey has experienced increasing environmental pressure (OECD, 2010).

As a result of this increased attention to environmental issue, in the 1982 Constitution and the environmental laws following from it, courses pertaining to the environment started to appear in national curriculum (Erdogan et al., 2009). The Ministry of Environment was established in 1991, and in 1993, the Turkish Environmental Education Foundation (TURCEV), a non-governmental organization

was founded (www.turcev.org.tr). Steps taken to join the European Union (EU) since the 1990s have contributed to an increase in environmental education activities and projects in schools (Erdogan et al., 2009). However despite these positive developments, environmental issues have not been adequately incorporated into economic and social decisions (Kaygusuz, 2007).

In 1995, Fien mentioned the importance of change in human understanding of the environment and he defined the aim of environmental education as “developing caring and committed attitudes that will foster the desire and ability to act responsibly in the environment”. Paraskevopoulos, Padeliadu, and Zafiroopoulos (1998) also emphasized that in a rich environmental education model, the first aim should be making people aware of the need and ways of protecting the environment. This awareness would make people act to preserve it (Paraskevopoulos et al., 1998). Alp et al., (2006) mentioned that as the environmental problems were caused by human beings, the most effective solution to the environmental problems would be to enlighten society on the subject of environment along with the legal arrangements. Since being able to cope with environmental problems lie in the alteration of human behaviour, educators must assess the factors influencing environmentally responsible behaviour, environmental knowledge and attitudes, and understand the relationship between these aspects (Alp et al., 2006).

Jensen and Schnack (2006) mentioned that overall objectives of environmental education are to build up students’ abilities to act—their action competence—with reference to environmental concerns:

The fundamental assumption is that environmental problems are structurally anchored in society and our ways of living. For this reason it is necessary to find solutions to these problems through changes at both the societal and the individual level. This is why the aim of environmental education must be to make present and future citizens capable of acting on a societal as well as a personal level. (Jensen & Schnack, 2006, p. 1)

It has been found that the foundations of pre-adult attitudes, thinking and performance about the environment are laid during childhood and are likely to affect behaviour throughout adulthood (Kirk & Karbon, 1986; Pomerantz, 1986; Wilson, 1993). According to research done by Tombul (2006) environmental education in Turkey does not appear to start in the early years. So it can be concluded that students in the early years of education in Turkey are not exposed to thinking and performance regarding the environment.

Elementary school curriculum within Turkey has recently placed emphasis on environmentally related topics from concepts that were developed in 1992, 2000, and 2006 (Erdogan et al., 2009). Most of the environmental content exists in the science curriculum for grades four and five in the Turkish Ministry of National Education Curriculum. Turkish students scored low on the international assessments of science and math (such as the TIMSS and PISA) which might suggest that the new science objectives in MEB should be developed in a way to satisfy the needs of modern society. These science curriculum objectives could be enriched by placing more emphasis on environmental issues. Turkish students' low scores in science and math (international tests such as TIMSS and PISA) indicated that the science and math education received is not at the standard that would make them compatible and competitive with students around the world. These low results suggest that science

and math curriculum in Turkey should be altered to give Turkish students a higher level of education that would enable them to acquire relevant and up to date knowledge, skills, attitudes, and environmental education within the science curriculum.

Other research, conducted by Alp et al. (2008) investigated elementary school students' environmental knowledge and attitudes, and how self-reported environmentally friendly behaviour is related to environmental knowledge. They further (2008) mentioned that elementary school children are considered to be a good starting point for attaining the ultimate goal of environmental education. The researchers gathered data by administering the Children's Environmental Attitudes and Knowledge Scale and Locus of Control scale to 1,140 students from 18 randomly selected elementary schools located in urban areas of Ankara, the capital of Turkey. Descriptive results indicated low levels of knowledge, while the analysis of data revealed that students' understanding of environmental issues seemed to be weakly developed. Most students had limited environmental knowledge regarding topics such as recycling, water and energy consumption, or environmental pollution (Alp et al., 2008).

As indicated above the students' level is not at an expected level. This low level of knowledge regarding environmental issues might suggest that the MEB curriculum is not functioning as required in a modern society. Therefore there is a need to enrich MEB curricula in terms of an action-based curriculum that involves more of environmental issues that should involve more environmental objectives,

environmentally rich curriculum materials and activities that encourage students to take action.

Problem

Environmental education is a learning process that increases knowledge, awareness, responsibility, and higher order thinking skills that enable individuals to take action regarding their environment. An effective environmental education should foster attitudes, motivations, and commitments to make informed decisions especially for students so that they can take responsible action to preserve the environment.

Environmental education is more effective if it starts in the early years of education (Leeming & Dwyer 1995; Trudel 1995, Reid & Sa'di, 1997), thus if a change in attitude should take place, this is the time to start receiving environmental education.

While definitions often emphasise action toward environmental outcomes, there are only a few studies (Yilmaz, Boone & Anderson, 2004; Alp, Ertepinar, Tekkaya & Yilmaz, 2008) conducted in Turkey which evaluate or compare the Ministry of Education elementary school curriculum on environmental education with other curricula from other countries.

In the renewed elementary school curriculum in Turkey (TTKB, 2005), environmental issues are incorporated into science units, in topics associated with the universe, living organisms, and life, biodiversity, matter, energy, and the relationship between humans and the environment. The curriculum aims to raise environmental knowledge and awareness. However, it is clearly mentioned by the United Nations (UN) that it is critical to increase students' awareness of environmental issues for achieving environmental and ethical values and attitudes, skills and behaviour

consistent with sustainable development and for effective public participation in decision-making. To be effective, environmental and developmental education should deal with the dynamics of both the physical/biological and socio-economic environment and human (which may include spiritual) development. It should be integrated in all disciplines, and should employ formal and non-formal methods and effective means of communication (UN, 1992). It is also mentioned in Agenda 21 (UN, 1992) that students must experience an environmental education curriculum which allows them to discover how they interact with the environment themselves and to assess their impact on the environment. By developing investigative skills, evaluative skills and action skills students would become intelligent consumers who make sound and responsible decisions about present and future developments of issues. International Union for Conservation of the Environment (IUCN, 1970) argues the same idea by mentioning that the main goals of the environmental education should be developing thinking skills and attitudes that would make the human race understand the relationship between the environment and human impact on it which is vital in order to take action to conserve the environment.

Emmons' (1997) contributed to Agenda 21 (UN, 1992) his definition of environmental action. According to Emmons (1997) environmental education should promote participation in a variety of forms of social action to help find solutions and apply those solutions to environmental issues.

Similar to Emmon (1997), Sanera (2008) also mentioned the importance of action-based environmental education. Sanera (2008) described environmental action and mentioned the significance of environmental action:

Environmental education's action goal goes well beyond personal behaviour. Political action is also a critical part of environmental education. After teaching students an environmental myth, environmental educators urge them to write letters to the editor, local city council member and even the president. Sometimes they even urge them to raise money for and join environmental groups. Acquiring knowledge is important in education, beside this aim; educators should motivate their students to participate and act to overcome issues. (Sanera, 2008, p. 3)

The elementary curricula that have been taught in the schools within Turkey need to be explored to find out whether they contain suitable skills, values and beliefs deep enough to preserve the environment. The curricula also need to be evaluated in order to explore environmental goals that support the learning of: environmental knowledge, awareness, certain skills that would be helpful in decision making, and especially, how and when to take action to protect the environment. In other words, to become active and informed citizens regarding the environment on an individual and community level.

Purpose

The purpose of this study was to make recommendations for elementary schools from kindergarten to grade five in Turkey to include environmental topics in school curriculum that enables students to acquire certain knowledge, skills and attitudes that will lead students to initiate action on finding and implementing solutions to environmental problems. Action is defined as demonstrations of deeper learning in responsible behaviour through responsible action; a manifestation in practice of the other essential elements of the curriculum (IB, 2007).

For this purpose:

Elementary social studies and science curricula from Canada, Britain, Turkey, and the International Baccalaureate Primary Years programme (IBPYP) were described, analyzed and compared to United Nations Environmental Education Curriculum for the Middle School (UNEPMS) of the United Nations Environmental Programme (UNEP). UNEPMS is a complete environmental curriculum that encourages action-based instruction. It was developed by Hungerford, Peyton, and Wilke in 1989. The environmental goals were written to be consistent with the environmental education categories included in the United Nations Tbilisi Conference Report (1978).

UNEPMS curriculum is the one and only complete environmental education that is described as an ideal prototype environmental curriculum promotes and encourages action by developers (1989). Objectives, environmental terminology, and activities in the UNEPMS curriculum were used as benchmark to compare other curricula.

Although UNEPMS is a curriculum for middle school learners from ten to fifteen years of age, it is suggested by the developers (Hungerford, Peyton, and Wilke, 1989) that these environmental goals can be used as maximum goals for elementary students to reach at the end of their elementary education and minimum goals for high school students to start their environmental education. Because of that, environmental objectives, activities and the focus of the content in the UNEPMS curriculum determined the maximum level of goals in this research for elementary students in Turkey to be expected to reach.

Further suggestions and opinions were elicited by interviewing educators and non-governmental organisation officials in Turkey.

Objectives, activities, environmental words and actions determined from the various curricula and interviews were used to make recommendations to the Turkey MEB elementary curriculum to improve it towards an action-based environmental curriculum.

Research questions

This study will address the following questions in order to determine the recommendation guidelines to provide an ideal environmental elementary school curriculum that initiates action on an individual and society level:

- A. How does the curriculum for environmental education in the primary school curriculum in Turkey, Britain, Canada, and International Baccalaureate (IB) curricula compare in terms of objectives, content, teaching and learning activities, and assessment?
- B. What are the curriculum guidelines of the UNEPMS prototype environmental education curriculum in terms of objectives, content, teaching and learning activities, and assessment?
- C. How does the comparison of curricula inform the development of an action-based curriculum in Turkey?
- D. How do experts perceive environmental education within Turkey?

Significance

The need for an environmentally literate citizenry is evident given the scientific consensus that human populations are fundamentally altering the natural systems that

sustain life on earth (Keeling & Whorf, 2005; Wilson, 2001). Today, all citizens need to be able to understand environmental issues and make informed decisions that will help maintain and protect the Earth's life-supporting systems (Covitt, Gunckel & Anderson, 2009). These statements give today's educators a very important mission, teaching our students about the human impact and irreversible changes on their environment. It is also vital to educate students about their responsibility to actively protect and preserve, to make informed choices to solve issues regarding the environment on an individual as well as a community level. It is the educators' responsibility to enable their students to understand and evaluate how individual life styles affect the environment and how individual actions towards solutions to the environmental problems can make a difference.

To this end, this study will endeavour to help educators enhance the content of elementary curricula, suggest activities, and environmental terminology in order to enrich teaching and learning activities towards an action-based instruction which empowers students not only to be knowledgeable about the Earth but also to be active and responsible participants to preserve and conserve its resources. This study analyses five different curricula from selected countries in order to determine whether environmental goals, attitudes and action have been incorporated into the curriculum. This analysis was used to compare those five curricula to UNEPMS as suggested by the UN. The results of this comparison and the interviews with the educators and environmental non-governmental organization (NGO) officials helped in the analysis of the extent to which the active preservation of the environment can be implemented in Turkish environmental education curriculum. According to the content analysis and suggestions from educators and non-governmental organization

officers, the components of each analyzed curricula promotes, explicitly teaches and encourages action-based environmental objectives, terminology, and activities which can be incorporated and used to enrich the Turkish National Education Curriculum towards an action-based environmental curriculum.

Definition of key terms

Environmental Education: Environmental education aims to developing skills and attitudes that would make the human race understand the relationship between the environment and human impact on the environment. In order to take action to conserve the environment, people should understand how their decisions and actions affect the environment (IUCN, 1970).

Environmental Action: Environmental action is a deliberate strategy involving decisions, planning, implementation and reflection by an individual or group that intends to achieve a specific environmental outcome (Emmons, 1997) which is generally to preserve and prevent damage to the environment.

Action-Based Curriculum: A curriculum which aims at the formation and development of the human personality by teaching ecological values knowledge, attitudes, understandings and awareness with respect to environmental issues and encourages a commitment to be involved in environmental action.

Active and informed citizens: These are citizens who acquire knowledge, attitudes, values, commitment and skills needed to protect and improve the environment (UNESCO, 1977). Potter (2010) described active and informed citizens as

individuals who know how to weigh various sides of an issue through critical thinking that enhances their own problem-solving and decision making skills.

Environmental literacy: Environmental literacy is global environmental awareness and increased commitment to social responsibility (Rowe, 2002).

United Nations Environmental Education Curriculum for the Middle School

(UNEPMS): A prototype environmental education curriculum that encourages and teaches action for the middle schools years which presents a framework, guidelines, and examples of environmental education curriculum (UNEP, 1994).

Ontario Environmental Curriculum (OEC): OEC is a fully integrated

environmental curriculum that embeds environmental education, expectations, and opportunities for students from grades one to eight (The Ontario curriculum, 2010).

British National Curriculum (BNC): BNC is a curriculum that aims to promote holistic growth (mental, spiritual, and physical) in order to prepare students for adult life and adult responsibilities through Key Stages which covers certain age groups (British National Curriculum, 2011).

International Baccalaureate Primary Years Programme (IBPYP) : IBPYP is a curriculum framework that includes scope and sequence documents for all subject areas for students age three to 12 and focuses on the development of the whole child as an inquirer, both in the classroom and in the outside world (IB, 2007).

The Turkish Ministry of National Education (MEB) Curriculum: A curriculum document for ages 6-18 that presents a framework, objectives and guidelines with the aim of raising literate and informative students who are willing to learn by a cognitive, constructivist, and trans-disciplinary approach (TTKB, 2005).

CHAPTER 2: REVIEW OF RELATED LITERATURE

Introduction

This chapter presents history of environmental education, how environmental education and environmental action was described, the components and the content of the environmental education in the literature and the research in Turkey on environmental education.

The beginning of environmental education

Although environmental education looks like a new area in science education, it can be seen that the roots of environmental education go to the 18th century.

Philosophers and writers such as Goethe, Rousseau, Montessori, and Piaget mentioned some environmental concepts such as “social justice “and “human responsibilities” to save the environment and living things. Their ideas have affected how environmental education is perceived today (Taskin, 2003). The term *environmental education* was mentioned the first time in the International Union for the Conservation of Nature and Natural resources (IUCN) in 1948. The IUCN was founded in 1948 with the aim of natural resource conservation. One of the commissions that have been established was the “commission for education and communication” (CEC) aiming at “strategic use of communication and education to empower and educate stakeholders for the sustainable use of natural resources” (retrieved from <http://cmsdata.iucn.org>).

One of the first definitions of environmental education was

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate inter-relatedness among man and his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality. (IUCN, 1970, chapter 36.6)

Although this definition was stated in the early years of environmental education, it is important because it indicates the relationship between humans and their environment. It clearly shows the aims of environmental education: developing skills and attitudes that would make the human race understand its relationship with the environment and its impact on the environment. In order to take action to conserve the environment, people should understand how their decisions and actions affect the environment. Understanding this relationship will allow informed choices to protect the environment and the living things around us. Environmental education plays an important role in training young people and their families to become aware of environmental issues and thus take immediate action to preserve environment (IUCN, 1970).

The history of environmental education shows that there is a close connection between changing concerns about environmental problems and associations founded to solve environmental problems. Associations and organizations such as IUCN, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Wildlife Fund for Nature (WWF) had an impact on the development of environmental education. Because of these organizations and their attention which focused on the environmental issues, it was inevitable that governments would

include environmental education in science education curricula. In 1969, the first Environmental Education Act (EEA) was proposed in the United States Congress. In 1970, the year of the first Earth Day Celebration, Congress passed the National Environmental Education Act (Lewis & Zeldin, 1991).

After this first concrete step for environmental education which stated a definition and explaining the importance of it in 1970 by the IUCN, environmental education has gradually been the subject of international environmental conferences. Due to the UNESCO conferences in Stockholm (1972), Belgrade (1975) and Tbilisi (1978), the framework of environmental education was established. In the Tbilisi Declaration, the role, objectives and characteristics of environmental education was constituted (UNESCO, 1978). The framework, principles, and guidelines for environmental education at all levels—local, national, regional, and international—and for all age groups both inside and outside the formal school system were established. At the Tbilisi conference (1978) the goals of environmental education were declared as the production of environmentally literate citizens who have the necessary skills and awareness to address challenges and to take environmentally friendly action.

In 1989, under the auspices of United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations Environment Program (UNEP) a Prototype Environmental Education Curriculum for the Middle Schools was first published in 1989 and revised in 1994. The purpose of this document was to present a framework, guidelines, and examples of environmental education for middle schools.

The goals on which UNEPMS was based were modified from those developed by Hungerford, Peyton, and Wilke in 1980. These goals were written to be consistent with the categories of objectives included in the Tbilisi Conference Report (1978). The writers of the UNEPMS curriculum have attempted to lay out options for dealing successfully with the heart of environmental education - the critical issues that citizens of all ages must learn to successfully cope with in their lives and to take action. Very specific suggestions were made with respect to the methods that can best create a middle school curriculum for learners age ten to fifteen years. However, these strategies, objectives, and activities could be used by curriculum developers who would like to create an environmental curriculum for all ages.

The UNEPMS curriculum encompasses cognitive knowledge and skills within the broad scope of environmental literacy, 1) ecological foundations; 2) issue awareness; 3) issue investigation and evaluation; and 4) issue resolution. The first two goals, foundations and awareness, focus on conceptual awareness of ecological principles and of environmental issues. The latter included goals which deal with the development and application of skills prerequisite to investigating and evaluating environmental issues and to participating in the remediation of those issues and taking action for resolution of the them.

The UNEPMS represents a revision of that earlier document, and attempts to reflect recent changes within the environmental education community and, in a larger sense, the global political climate. It is evident from numerous public, private, and governmental policy statements, position papers, and reports that a new concept is emerging, one that will have far-reaching significance at local, regional, national, and international levels. That concept is called "sustainable development". (UNEP, 1994, p. 1)

According to Hungerford et al. (1980), the objectives apply to all age groups, even though the detailed targeted objectives are designed for middle school learners according to their developmental stages. The objectives of the environmental curriculum can be used either for maximum objectives that elementary students need to learn before they start middle school or minimum objectives that high school students need to have acquired before they start their high school education. UNEPMS focuses on instructional strategies associated with the teaching of issues and more importantly, citizenship responsibility (UNEP, 1994). It is evident that the strands, objectives and activities of UNEPMS promote an action based environmental curriculum.

After the goals of environmental education were declared in the Tbilisi Conference (1978), the next concrete step was taken in a conference in Rio de Janeiro in 1992. This conference was called the “Earth Summit” and the message of this conference that “nothing less than a transformation of our attitudes and behavior would bring about the necessary changes” was observed by almost 10,000 on-site journalists and heard by millions around the world (UNSD, 1992).

The Earth Summit influenced all subsequent United Nation conferences, which have examined the relationship between human rights, population, social development, women rights and human settlements — and the need for environmentally sustainable development ([http: www.un.org](http://www.un.org)). Governments recognized the need to redirect international and national plans and policies to ensure that all economic decisions fully take into account any environmental impact (Taskin, 2003). In this

conference a programme related to sustainable development called Agenda 21 was declared. In Agenda 21, the goals of environmental education are indicated as follows:

Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues. While basic education provides the underpinning for any environmental and development education, the latter needs to be incorporated as an essential part of learning. Both formal and non-formal education is indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. It is also critical for achieving environmental and ethical values and attitudes, thinking skills and active behaviour consistent with sustainable development and for effective public participation in decision-making. To be effective, environment and development education should deal with the dynamics of both the physical/biological and socio-economic environment and human (which may include spiritual) development, should be integrated in all disciplines, and should employ formal and non-formal methods and effective means of communication. (Agenda 21, 1992, section IV, chapter 36.6)

In this explanation in Agenda 21 (1992) the emphasis is on promoting sustainable development and improving the understanding and capacity of the people and developing relevant skills and active behaviour to address environmental issues. Agenda 21 (United Nations Division for Sustainable Development, 1992) inspired many stakeholders in education and it is one of the mile-stones of environmental education. As an example, one of the recommend areas for environmental education in Agenda 21 is “reorienting education towards sustainable development”. Agenda 21 had a significant effect on environmental education because of the areas and objectives of environmental education have clearly stated in the programme that

shows how to integrate environmental concepts, skills and attitudes into a curriculum (UNEP, 1994).

In 1997, “Earth Summit II” was held in New York to review the progress made from the first “Earth Summit” in Rio in 1992. Agenda 21 and the principles contained in the Rio Declaration on environment and development which established a comprehensive approach to the achievement of sustainable development. The next “Earth Summit” conference was held in South Africa in 2002 to discuss a plan of implementation of sustainable development. It has been decided at the summit in South Africa that all nations should work together to help one another gain access to financial resources, benefit from the opening of markets, ensure capacity- building, use modern technology to bring about development and make sure that there is technology transfer, human resource development, education and training to banish underdevelopment forever (retrieved from <http://www.un-documents.net>).

United Nations Environment Programme was founded as a result of the United Nations Conference on the Human Environment in June 1972. The agenda was developing international environmental conventions, promoting environmental science, and information and illustrating the way these can be implemented in conjunction with policy, working on the development and implementation of policy with national governments, and regional institutions in conjunction with environmental NGOs (UNEP, 1994).

United Nations Environment Program (UNEP) has an Environmental Education and Training (EET) department that aim to promote attitudes and value systems which

influence environmentally ethical behaviour by developing understanding, skills, and values that will enable people participate as active and informed citizens in the development of an ecologically sustainable and socially just society. The EET activities were founded on its mission of inspiring, informing, and enabling nations and individuals to improve their quality of life without compromising that of future generations. EET develops programmes, publications, and events to achieve their goals (retrieved from <http://www.unep.org>).

What does environmental education incorporate?

According to Hines, Hungerford and Tomera (1987), the primary goal of environmental education is to develop an environmentally literate society. One obstacle to developing environmentally responsible citizens is a lack of awareness of all the factors that affect the development of environmentally responsible behaviours. In their study, Hines et al. (1987) emphasizes the importance of people's awareness of environmental issues. In their article, Hines et al. (1987) indicated the importance of meaning in outcomes. Environmental issues, especially global issues, should be connected to a learner's life to lead them to action towards solutions to environmental issues.

According to Stevenson (1987), environmental education involves,

...the intellectual tasks of the critical appraisal of environment and the formulation of a moral code concerning such issues, as well as the development of commitment to act on one's values by providing opportunities to participate actively in environmental improvement.
(p. 69)

Stevenson (1987) also emphasizes human understanding and appraisal of the environment. The perspective he adds to the other definitions is the formulation of a moral code concerning environmental issues. Awareness of environmental issues will be stronger and more powerful when it is supported by a moral code.

In 1995, Fien mentioned the importance of change in human understanding of the environment and he defined the aim of environmental education as “developing caring and committed attitudes that will foster the desire and ability to act responsibly in the environment”. All definitions from IUCN (1970), Stevenson (1987) and Fien (1995) mention the importance of human understanding. Fien (1995) set similar objectives of environmental education as developing skills and attitudes that would lead us to take action to conserve the environment, as set by IUCN (1970).

According to Meadows (1989), environmental education is the preparation of people for their lives as members of the biosphere. It is learning to understand, appreciate, work with and sustain environmental systems in their totality. Environmental education is fundamentally education in problem-solving from philosophical basis of holism, sustainability, enhancement and stewardship.

Although Meadows’ definition is similar to the other two definitions above, he adds another perspective which is very important in order to help human to find and apply solutions to problems: problem solving skills. Developing proper skills and attitudes should be supported by problem solving skills (Meadows, 1989). Because the problems we face every day require us to make decisions. It is very important to

teach our students problem solving skills that would help them to set goals for themselves, face challenges, and then strive to overcome them.

Jensen and Schnack (2006) argued the types of learning experiences and their impact on students learning within the environmental education. They indicated that the overall objective of environmental education is to build up students' abilities to act with reference to environmental concerns.

Hart (1997) mentioned that with the environmental education we should be preparing our students not for this society but a *better society* by letting students do research, plan and act toward the environmental issues, and give them opportunities to see the impossibility of their ideas being carried out and failures of the process. The main goal of the environmental education that leads participation is "conscientization" becoming aware through facing and articulating difficulties. It is important to teach students real facts that might make them uncomfortable but would lead them to find solutions to the issues that make them feel uncomfortable. He emphasized that environmental programmes need to be based on the identification and investigation of problems by the residents themselves (Hart, 1997).

Chawla (1998) also supports active student learning by doing hands-on activities. According to Chawla (1999) time spent outdoors in the natural areas by doing investigation and researches are the valuable activities that would trigger students' interest and lead them to take action. Chawla (1999) stated that childhood experiences in nature are one of the most effective factors that sensitize people's awareness. Chawla suggests that environmental education should offer activities and

experiences that would take place in the natural areas to be more influential on children's awareness and participation during the childhood.

Layrargues (2000) also highlighted the importance of real life experiences in the environmental education. He suggested that effective environmental education should focus on local environmental issues. He also states that within environmental education, educators can prioritize explanations of local problems which people face in their daily life. People may therefore be more willing to take action to solve local environmental problems if these issues are the ones that students face in everyday life.

Venkataraman (2008) stated that environmental issues are complex and draw on many disciplines in the field of environmental education. He argued that to teach practical problem solving, the curriculum must be "hands-on" and include in- and out-of-class activities. An ideal environmental education motivates personal responsibility, for this aim it must emphasize the impact of human consumption patterns. Venkataraman (2008) concluded that to inspire action, environmental education must consider culture, diversity, ethics, and justice.

Action-based approach in environmental education was suggested by Kollmus and Angyeman (2010) as well as researchers mentioned above. According to a research that conducted by them, in most cases, increases in knowledge and awareness did not lead to pro-environmental behaviour. This behaviour was defined by Kollmus & Angyeman (2010) as "that consciously seeks to minimize the negative impact of

one's action on the natural and built world" (p. 240). Only a small fraction of environmental behaviour that can be seen in pro-environmental behaviour can be directly linked to environmental knowledge and environmental awareness. Kollmus and Angyeman (2010) suggested that to be able to teach pro-environmental behaviour, educators should give students opportunities to practice it with different activities that take place in the natural environment until it becomes a habit.

Training the public in environmental education could help them to be aware of the problems. But will it help them to act towards finding solutions? In the goals above it is very clear that training for public awareness is the primary goal of environmental education. What it is not very clear is whether training for awareness will be enough for individual action and applying solutions to environmental problems.

Environmental action

According to Tilbury (1995), the ultimate purpose and justification for environmental education is considered to be environmental education for sustainability (EEFS). Environmental activities will need to be relevant to the student, through increasing their understanding of themselves and the world around them. It must encourage pupils to explore links between their personal lives and the wider environmental and developmental concerns, by dealing with issues like consumerism and how the practices of business and industry influence their lives and their environment. Environmental education should prepare students for contemporary reality.

Emmons (1997) defined “environmental action” and set it as a primary goal of environmental education. According to the author, environmental action is a deliberate strategy involving decisions, planning, implementation and reflection by an individual or group that intends to achieve a specific environmental outcome. Because environmental education should promote participation in a variety of forms of social action to help find solutions and apply those solutions to environmental issues, Emmons’ goal has value in the environmental education literacy.

Similar to Emmons, Jensen and Schnack (2006) described environmental action and stressed the significance of environmental action. They mentioned the importance of understanding what motivates individuals to move beyond behaviour which may be the result of habit or avoiding reprimand, to initiate action. The focus should be on how young people see themselves as becoming leaders (developing an action competence), choosing and initiating their own actions instead of responding with behaviour change to the persuasions of others.

Tilbury (1995), Emmons (1997) and Jensen and Scnack (2006) emphasized the importance of critical thinking skills, reflection, democratic values and acquisition of knowledge of human impact on ecology and ecological problems. Tilbury (1995) explained the role of the media in helping the public to determine the environmental issues and political decisions that affect the production distribution and use of resources. According to Tilbury (1995), the visual and written media should be used in a way to increase awareness and help people to see their effect on the environment. Media education can be a part of environmental education in the

schools in order to understand its power on people and to learn the ways to use it to conserve the environment.

According to Hart (1997) a substantial part of an educational programme, particularly for pre-adolescent children, should involve some kind of direct action with the environment if educators want participation. However, educators usually assign children to work on environmental projects rather than involving them in identifying problems themselves and collaborating with them in finding solutions. Hart advocated that schools should allow young children to play regularly in a diverse natural setting as possible surrounding the school and provide regular opportunities for the enjoyment of natural environments. These should be close to the native home-wild common lands, gardens, ponds, city farms, or school grounds. He stated that these are crucial for students to take action which leads to affection, and also skills for resourcefulness and cooperation.

Ramey (2008) also investigated the need for informed environmentally literate citizens and the ways environmental education can meet with these needs. In her research, she studied childhood experiences and the potential impact of those experiences on fostering a caring concern for the environment. She surveyed 178 participants, ages 20-67 on the importance of getting children out in the natural world. According to the research results, she found that participants in the study confirmed and expanded on the trends noted in the literature related to the importance of children experiences in the natural world. Ramey (2008) concluded that educated decision and policy makers should consider the trend in environmental education research and attempt to find the answer to the question of how we raise

environmentally literate children and community members who care for the environment and preserve it.

Carrier (2009) suggested activities and interactions with nature for environmental action. In her research, she examined the impact of environmental education lessons by comparing activities conducted in the schoolyard with traditional classroom activities involving elementary students. She discovered that the introduction of additional active learning environments in the elementary school science curriculum may improve student learning. Carrier (2009) concluded that lessons which take place in the outdoors can enhance environmental education for elementary students which develops a deeper understanding which ultimately can lead to environmental action.

Riordan and Klein (2010) suggested that teacher education, teaching and learning activities, and their location influences environmental action. They concluded that teachers should encourage students to be actively involved in solving real world problems. Because inquiry stimulates student curiosity and enthusiasm towards environmental issues, students should engage in learning expeditions, active investigations, and amelioration of the real world problems of relevance to the communities where they live (Riordan & Klein, 2010).

Short (2010) emphasized the importance of critical thinking activities for students' action and participation. He suggested that to develop environmental awareness educators should focus on developing critical thinking skills thus reducing the need

for raising awareness activities and allowing more time for higher order thinking skills, research based, and action based activities.

According to Stern, Powell and Ardoin (2011) environmental education needs to draw on constructivist theory where students build on their own existing knowledge to develop a deep understanding. They advocate that this approach will actively engage students in learning about environmental issues generally using cooperative or collaborative strategies. Building on existing knowledge in a social learning environment gives opportunities to the students to discuss, generate, and examine their own ideas which lead to the internalization of knowledge. Stern et. al. (2011) stated that when students internalize knowledge they become more active participants of the environment.

Mutisya and Barker (2011) disclosed in their research that, although primary students in Kenya have knowledge about the effects of environmental issues, they do not know how environmental issues should be managed. They recommend that environmental education should be taught both theoretically in class using interactive pedagogies to enhance active teaching and learning and practically in the environment, providing solutions to local environmental issues and giving students opportunities to create and examine their own solutions.

Environmental action is the primary goal of environmental education; therefore environmental education should bring ideas together regarding the improvements to the content, practices, teaching, and learning activities for an effective curriculum to

lead students towards the solution of environmental issues and to take responsibility for their own behaviour, choices and actions.

Environmental education research in Turkey

There are a few surveys that examine environment-related variables focusing on Turkish students' attitudes toward the environment. Berberoglu and Tosunoglu's (1995) study aimed to determine university students' views on environmental issues. The students participating in this study selected energy conservation, nuclear energy, population growth, and environmental problems as the most important environmental issues in Turkey, whereas the relationship between humanity and nature, recycling, negative consequences of population growth and technology, did not form a consistent pattern. The authors of this study addressed two reasons why Turkish university students gave little attention to the latter environmental issues. Firstly, environmental concepts concerning these issues were not emphasized in the formal school curricula. Secondly, the mass media, which is expected to provide the basic information on environmental literacy, had not taken the necessary actions to increase students' awareness about environmental concepts.

A study by Yilmaz, Boone, and Andersen (2004) tried to identify Turkish elementary and middle school students' views on environmental issues covered in the national science curriculum. According to the results of this study (Yilmaz et. al., 2004), Turkish students were aware of the importance of environmental issues, when they are asked to make choices between environmental protection and economical growth they had difficulty emphasising environmental protection over economical growth. Yilmaz et al. (2004) suggested that an inquiry learning environment in Turkish

classrooms may help students to think in more detail about environmental issues and may help students understand these concepts better.

A recent study by Tuncer, Ertepinar, Tekkaya, and Sungur (2005) aimed to determine Turkish elementary and high school students' attitudes toward the environment by using a questionnaire which included four dimensions: awareness of environmental problems, awareness of national environmental problems, solutions to the problems, and awareness of individual responsibility. The results of the study showed that the attitudes of young people toward the environment appeared to be favourable. These students had a common belief that if Turkish citizens did not make drastic changes in their lifestyles, environmental problems would become a much more serious threat to human life and nature. In comparison with previous research findings, the students in this study took responsibility toward the emerging environmental problems in Turkey, but they did not have clear opinions on the needs for economical growth through industrialization and for environmental protection.

This research conducted in Turkey has provided information on the general views of students regarding environmental issues, but there is a lack of research on factors that affect the main goal of environmental education environmentally friendly behaviour (Alp et al., 2008). As it was proposed in the world's first intergovernmental environmental education conference in Tbilisi (1978), environmental education should focus on ensuring every age group is taught environmental education. Environmental education should aim to set a foundation for environmental sensitivity, problem-solving skills, and values. Furthermore, special emphasis should be given to the enhancement of sensitivity toward environmental issues regarding the

learner's own community in early school years (UNESCO, 1977). It is crucial to determine the developing environmental attitudes and knowledge during this formative period, since children acquire knowledge and develop attitudes about environmental issues as early as kindergarten (Leeming & Dwyer, 1995). Children are likely to progress faster in early ages than older generations and are more sensitive toward nature and thus should play an active role in the protection of the environment (Trudel, 1995).

Another research project conducted by Bas, Teksoz and Ertepinar (2011) attempted to define environmental attitudes among primary school children living near local features that might affect developing an effective environmental education. They underline the need for constructing and revising environmental education practices in Turkey in order to consider the sustainable use of natural resources, local economy, and attitudes of local people, especially the young groups. They also recommend that in such places that the local economy relies on agriculture and where pollution due to agricultural activities constitutes a threat, the content of environmental education may aim to enhance student' attitudes related to those issues (Bas et. al., 2011).

Bozdogan (2011) analyzed studies regarding global warming problem conducted within education in the world and within Turkey. He found that experimental studies revealed where education methods allowed the students to be active, use visual materials, and social activities outside the school were more effective methods in educating more conscious students about global warming. Thus, he emphasizes the importance of the social learning that takes place in nature to encourage students to take action.

There are some other research conducted in Turkey about environmental education regarding teachers role in the effectiveness of the environmental education.

Keles (2007) analyzed the impact of ecological footprint applications used as a tool of environmental education on changing the awareness, attitudes and behaviours of science and technology education teacher candidates. According to Keles, environmental issues are closely related with sustainable life and the main goal of the environmental education should be teaching and learning about the sustainable life and development. In his research, Keles focuses on science teachers' attitudes and awareness on their impact on the environment and finds out that learning about ecological footprints can be used to improve teachers' attitudes and awareness towards the environment in a positive way.

Another recent research project on environmental education within Turkey investigated the environmental literacy of pre-service teachers. Tuncer, Tekkaya, Sungur, Cakirohlu, Ertepinar and Kaplowitz (2009) investigated environmental literacy of pre-service teachers at one of the largest public universities in order to evaluate the relationships of environmental knowledge, attitudes, and concerns with environmental problems. Although it does not focus on primary education or action-based instruction, teacher education and attitudes towards environmental education and the delivery of environmental objectives have an impact on student learning.

It can be concluded that although there are some research in Turkey about Turkish elementary students' environmental awareness, knowledge and attitude towards the

environment, and teacher training in environmental education, more research needs to be conducted on environmental education especially action-based curriculum which teaches and lead students to take action to preserve the environment in Turkey would benefit the improvement and development of environmental education in their native country. The incorporation of an action-based environmental education curriculum is essential to ensure that Turkish students learn to take responsibility to preserve and protect their environment and to become active and informed citizens regarding the environment on an individual and community level.

In the next chapter, research method and design that was used in this study will be presented.

CHAPTER 3: METHOD

Research design

Content analysis was used as the method to analyse environmental objectives, frequency of environmental vocabulary, teaching and learning activities and assessment approach of the curricula mentioned in Chapter 1 Research Questions. Curricula from Ontario, Canada; England, Britain; Turkey and International Baccalaureate were compared to UNEPMS designed and suggested by United Nations.

Content analysis has been defined as a systematic, replicable technique for compressing many words of text into fewer content categories (Krippendorff, 2004). According to Fraenkel and Wallen (2006), content analysis is a method that has wide applicability in educational research, such as in showing how schools handle similar phenomena differently. They have also stated that content analysis is the best method to determine the presence of objectives, beliefs, values and behaviours in the curriculum.

In this study, content analysis had three components: Analysis of the number of environmental objectives in each curriculum, analysis of the frequency of environmental vocabulary in each curriculum and analysis of number and type of environmental activities in each curriculum. The results of each analysis are shown in Tables and explained qualitatively.

Number of environmental objectives: Five curricula were analyzed to determine the number of environmental objectives in the analyzed curricula. The number of environmental objectives and their percentage to all of the learning objectives in the curriculum indicates to what extent the curricula comprise and emphasize the environmental education. In this study, some key words like *environment*, *sustainable development*, *recycle*, *reduce*, *reuse* were scanned in all of the objectives in order to separate environmental objectives from the other objectives in the curriculum. Because this research aimed to make recommendations to enrich the Turkish MEB elementary curricula towards a more action-based environmental instruction; environmental objectives in MEB curriculum were analyzed in more detail under raising awareness objectives, research-based objectives, action-based objectives and critical thinking objectives.

Frequency of environmental vocabulary in each curriculum: It was considered in this study that the frequency of words indicates the focus of the content within the environmental objectives in the curriculum because that would indicate what is taught to the students in a certain amount of time. In their article, Pleasant, Shanahan, Cohen and Good (2001) researched literature of “environmental communication”. According to Pleasant et al. (2001) there are specified keywords covering environmental communication topics in the social science journal literature from relevant indices. *Environment*, *environmental*, *nature*, *renewable* were some of the key words researchers have found in the literature. These words included in the analysis of the frequency of environmental terminology. Because this research aims

to determine action-based objectives and activities, *action, active, participation, sustainable development* is included in this study for the analysis.

Type and number of environmental activities in the curricula: Five curricula were analyzed to determine the number and type of environmental activities in each one. It is expected that the number of certain type of environmental activities will indicate what kind of activities are valued in the curricula. The activities were analyzed under four titles: raising awareness, critical thinking, action-based activities and research-based activities. These categories come from two sources: UNEPMS and the purpose of this research. Action-based activities from each curriculum were analyzed separately in detail.

In order to collect thoughts and ideas of educators and environmental non-governmental organizations (NGO) interviews with a number of educators from a leading state university and a private elementary school administered. These individuals are experts in early years and elementary education and have worked with the Turkish Ministry of National Education (MEB) to prepare programmes and text books for students and guide books for teachers. NGO officials who were interviewed actively work to solve environmental issues in Turkey. Face to face, semi-structured interviews with educators and NGO officials were recorded and transcribed. The interview questions were prepared based on the research questions of this study. Interview results are shown in tables (Tables 9-14) and explained qualitatively.

The content analysis and interviews used to prepare “recommendations for elementary schools in Turkey from kindergarten to grade five to include environmental topics in school curriculum” were prepared and can be seen in Chapter 5. The recommendations shared with the interviewees and changes made according to their feedback. Sample lesson plans on sustainable development that were prepared according to the content analysis results and suggestion of educators and non-governmental organizations can be seen at Appendix C.

Curricula selected

Five curricula from selected countries were analyzed and compared:

- Elementary life science curriculum for grades one through three, social studies and science curriculum for grades four and five from Turkey (2005)
- British National Curriculum for England; Britain: Programme of study: Science, Geography, Personal, Social and Health Education for Key stage one and two (1999)
- The Ontario Environmental Curriculum, Canada Grades 1-8 (2009)
- International Baccalaureate Primary Years Programme science and social studies scope and sequence documents (2009)
- United Nations Environmental Programme: A Prototype Environmental Education Curriculum for the Middle Schools (Revised, 1994)

Participants

Three educators from a leading state university in Turkey, two teachers and one administrator from a private elementary school in Turkey were the participants of interviews with educators. Three officers from three different non-governmental

environmental organizations in Turkey were the participants of interviews with non-governmental organizations.

Sample	N
Non-governmental organizations	3
Educators	6

Method of data collection

Content analysis

Data from the curricula were collected using content analysis. Content analysis had three components: number of environmental objectives, frequency of environmental vocabulary, and number of activities.

Number of environmental objectives: Number of environmental objectives and their percentage to all of the learning objectives in the curriculum were determined by reading the objectives in each curriculum, an analysis of each for key words by using Microsoft word search, and rereading objectives that had the key words to determine the environmental objectives. After determination of environmental objectives the key words were counted and placed in Table 1.

Frequency of environmental vocabulary: Key words selected from the research conducted by Pleasant, Shanahan, Cohen, and Good (2001) which researched literature of “environmental communication” were used as key environmental words for this research project. In order to collect more detailed data *active* and *action* were

analysed as two different environmental vocabularies. Key words selected were counted in each objective by using Microsoft word count and placed in Table 2.

Number and types of activities: The environmental activities analyzed under four titles which come from UNEPMS and the purpose of this research: raising awareness, critical thinking, action-based activities and research-based activities. Activities from each curriculum were read, categorized under determined titles and counted under the relevant category.

Assessment approach: Because the studied curricula do not give extensive and sufficient information on environmental assessment strategies; the assessment approach of each curriculum was read in the curriculum documents, each of them analyzed and explained qualitatively. The information on assessment approach in the studied curricula was grouped as formative assessment and summative assessment for data collection, analysis, and comparison.

Interviews

Face to face, semi-structured interviews were administered with educators and NGO officials. The interview questions used with the educators emerged from the main goals of this research and were presented in Appendix A. The interview questions for educators were aimed to collect educators' ideas, thoughts, and views on the characteristics of an effective environmental education, environmental education in Turkey and approaches for an action-based curriculum. The interview questions for the NGO officials were designed to find out in what ways they addressed environmental issues, age group that participates most in their activities, and in what

ways non-governmental organizations and the schools can cooperate to empower action-based environmental education. Questions for NGO officials can be seen in Appendix B. Open ended questions were asked, responses of educators and NGO officials were recorded, transcribed and translated from Turkish to English. After the transcription of the interviews, certain categories were determined according to aim of this research. Transcribed and categorized responses were used to prepare recommendations to improve Turkish MEB curriculum towards an action-based environmental curriculum.

Method of data analysis

Content analysis

Number of environmental objectives, frequency of environmental vocabulary, number and types of activities and assessment strategies from the determined curricula were examined and analyzed and results were presented in tables and explained qualitatively.

Number of environmental objectives was determined by counting the number of objectives using Microsoft word count using key words such as *environment*, *sustainable development*, *recycle*, *reduce*, *reuse* were scanned in all of the objectives in order to separate environmental objectives from the other objectives in BNC, MEB, and IBPYP curricula. “Explains why he/she should consume resources wisely at the school” (TTKB, 2005), “Uses technological products without harming environment and others” (TTKB, 2005), “identify or generate a question or problem to be explored in relation to human impact on the local, natural environment” (IB,

2007), “to realise that people and other living things have needs, and that they have responsibilities to meet them” (BNC, 2011), “what improves and harms their local, natural and built environments and about some of the ways people look after them” can be given as examples of learning objectives classified as environmental objectives.

In the UNEPMS curriculum all of the objectives were counted as environmental objectives as it was stated in the curriculum (UNEP, 1994). In the OEC curriculum, environmental objectives were integrated into all of the subject areas. The environmental objectives were given in the curriculum documents (OEC, 2010). These objectives were read and analyzed using the same method of Microsoft word count in order to produce consistent data from all the curricula.

This research aimed to make recommendations which could enrich the Turkish MEB curriculum towards a more action-based environmental curriculum; to this end data from the Turkish MEB curriculum was analysed in more detail than the other selected curricula. The number and type of environmental objectives in the MEB curriculum from every grade level classified as raising awareness, critical thinking, research-based, and action-based objectives in order to evaluate the curriculum thoroughly. “Understands the role of senses to know the nature” can be given as an example to raising awareness objective while “find alternative solutions to preserve environment” is an example to action-based environmental objective. “Researches how humans change environment” has classified as a research-based environmental objective while “develops ideas to find out solution to environmental problems” has classified as a critical thinking environmental objective. Following this approach, the

data was analyzed qualitatively. The environmental objectives in *life science*, social studies, and science from each grade level were classified as described above, in order to analyze the data in detail.

The environmental objectives that were determined after the first step of data analysis were examined and analyzed in order to determine the frequency of environmental words in each curriculum. Environmental words that were to be analysed according to the research of Pleasant, Shanahan, Cohen and Good (2001), were searched and counted within the environmental objectives in each curricula. Although *active* and *action* were not mentioned separately in their research, they were analyzed as two different environmental words in order to obtain more detailed data about action-based objectives and words. *Action* indicated the behaviour done by a person while *active* indicated the person who does the action or an attitude towards *action*. “They take responsibility for their own actions” (IB, 2007), “students reflect on opportunities to contribute actively to the community at a range of levels, from local to global” (IB, 2007), “understands how important it is to be active to show they can take some responsibility for themselves and their environment” (BNC, 2007) can be given as examples. The number and percentage of environmental words within the environmental objectives in each curriculum are described in Table 6 and explained qualitatively.

The curricula were also examined to determine the environmental activities and types of activities in each curriculum. The activities in the curriculum were sorted according to the determined types. The determined activity types are: research-based

activities, critical thinking activities, action-based activities, and raising awareness activities.

Raising awareness activities are the knowledge and understanding based activities i.e. worksheets, teachers directed lectures, listening to a guest speaker. “Understands the ways in which a variety of plants adapt and/or react to their environment, including changes in their environment, using a variety of methods such as reading a variety of non-fiction texts, viewing DVDs or CD-ROMs” (OEC, 2010) and “students understand similarities and differences between different natural and artificial nature by listening to a story about a natural forest and manmade park and talk about the similarities and differences between them” (TTKB, 2005) are some examples of raising awareness activities.

Critical thinking activities aim to teach higher order thinking skills by discussions, observations, critical judgements, problem solving, and analysis. “Interpreting and evaluating data gathered in order to draw conclusions from their observations to find out the needs of living things that enable them to stay healthy” (IB, 2007) and “comparing solid waste generation in different countries by looking at data collected from internet” (UNEPMS, 1994) can be given as examples to critical thinking activities.

Action-based activities can be described as hands on authentic activities that are linked to real life, activities that take in the nature and/or in the field where students learn in the habitat of what they are learning about. Action plans endeavour to move towards certain actions such as finding and applying real life solutions to real life

problems. An example from BNC curriculum, a student is instructed to go to a local lake to learn about the natural habitat of bugs in the lake, collect some examples, search what they need to survive, and students' own impact on this habitat and insects. In addition, students should act in order to preserve this local lake and insects which reside there. Some other examples from UNEPMS curriculum are convincing a friend to recycle aluminium and convincing parents to purchase foods which come in environmentally-appropriate packaging. Developing some simple procedures to clean close environment such as starting a garbage collection campaign can be given to action- based activities from MEB curriculum.

Research-based activities are the ones that students conduct any stage of a research, applying surveys, and drawing conclusions from surveys and investigation of environmental issues. Examples from the MEB curriculum was determining and making a list of items that would cause pollution; investigating the responses of plants or animals to changes in their habitats by using a variety of instruments, and tools to measure data accurately. From the IBPYP curriculum was researching the ways in which living things need protection by using internet and/or interviewing with an expert from BNC.

The environmental activities in each curriculum were analysed using the above categories, numbers, and percentages in each curriculum calculated, placed and shown in Table 7 and explained qualitatively. Because this research aims to make recommendations to enrich the Turkish MEB curriculum towards an action-based environmental instruction, action-based activities in each curriculum were analyzed in more detail. In order to do this, four categories of citizenship action from

UNEPMS (UNEP, 1994) were used to analyze action-based activities in detail: persuasion, consumer action, political action, and eco-management. Collaboration and individual action (IB, 2007) was another category for the analyses of action-based activities.

To analyse the assessment approach in each curriculum, the information about the assessment was categorized under formative and summative assessment. The information on formative and summative assessment strategies in selected curricula were read, analysed, and explained qualitatively.

Interviews analysis

Semi-structured, open -ended interviews were recorded, transcribed and translated from Turkish to English. The responses from educators and NGO officials were read several times to become familiar and understand the data with the aim of determining the categories that corresponds with the aim of the interviews. The key questions in the interview questions that are relevant to the aim of this research determined the categories. Categories for interviews with educators are:

- Thoughts of educators about environmental education in MEB curriculum
- The age that environmental education should start
- The ways environmental education should be delivered to the students for action-based learning

The key words, phrases, and sentences from the educators' responses were placed under each category. In order to classify responses in more detail, another code of unit was determined and aligned with the research questions. These codes are age,

objective, activity, and assessments were shown in the third column of Tables 9-11. Categorized and classified responses from educators were explained qualitatively.

To analyse transcribed responses from NGO officials, categories were determined which were aligned with the aim of interviews. These categories are:

- Type of activities and tasks NGOs do with younger participants
- Approaches NGOs use to make children participate environmental actions
- The ways NGOs can cooperate with the school to empower action-based environmental education

The key words, phrases and sentences from the NGO officials were placed under certain categories which they corresponded with. The responses in these certain categories were also classified as age, objective, activity, and assessment to determine alignment between responses from NGO officials and the research questions. Categorized and classified responses from NGO officials were presented in Tables 16-18 and explained qualitatively.

CHAPTER 4: RESULTS

Introduction

The purpose of this study was to make recommendations for elementary schools from kindergarten to grade five in Turkey to include environmental topics in school curriculum that enables students to acquire certain knowledge, skills, and attitudes that will lead students to initiate action on finding and implementing solutions to environmental problems.

With this aim, elementary curricula from Ontario, England, Turkey, the International Baccalaureate Primary Years programme (IBPYP) and the United Nations Environmental Programme Middle School (UNEPMS) curriculum were described, analyzed, and compared to each other.

The UNEPMS is an environmental curriculum for middle schools as an ideal, prototype curriculum for middle school students which was developed by Hungerford, Peyton, and Wilke in 1980 with revisions in 1994. Components of the UNEPMS were written to be consistent with the categories of objectives included in the United Nations, Tbilisi Conference Report (1978), and encompass cognitive knowledge and skills within the broad scope of environmental literacy.

According to Hungerford et al. (1980), the objectives apply to all age groups, even though the detailed targeted objectives are designed for middle school learners

according to their developmental stages. The objectives of the environmental curriculum can be used either for maximum objectives that elementary students need to be reached before they start middle school or minimum objectives that high school students need to have acquired before they start their high school education. In this study, as a complete environmental curriculum, the level of environmental objectives in the UNEPMS was determined as the maximum environmental goal level that elementary students will be expected to reach.

The other fully integrated curriculum that is written and taught in English is the Ontario Environmental Curriculum (OEC). OEC is a fully integrated curriculum into all subject areas for the students from Kindergarten to grade eight in Ontario, Canada. It embeds environmental education expectations and opportunities in all grades and in all subjects of the Ontario curriculum (The Ontario Curriculum, 2011). Therefore this curriculum was analyzed in order to find out the strengths and weaknesses in environmental education in the curriculum itself in order to guide this study and compare these components with the UNEPMS and the Turkey Ministry of Education MEB curriculum.

The other curricula that were analyzed are the British National Curriculum (BNC) and the International Baccalaureate Primary Years Programme (IBPYP).

The BNC was analyzed because of the language it was written, and also the active environmental behaviour of British citizens. There are various researches that show active participation of British citizens in environmental action and relate this behaviour with the environmental education in the curriculum (Copeland, 1976;

Harris, 1991). Therefore, the BNC was analyzed to find out what elements of the curriculum empower students to take environmental action.

The IBPYP is an international curriculum for elementary schools developed by International Baccalaureate Organization. It can be seen in the IBPYP curriculum that environmental objectives take place in the science curriculum, within two strands: living things and earth and space. In the IBPYP social studies curriculum, environmental objectives take place within the strands of human and natural environments, resources, and the environment.

The IBPYP gives the minimum standards and expectations that IBPYP schools should implement within the scope and sequence documents and also gives flexibility to the schools in creating their own curriculum as long as the level of overall expectation regarding student achievement expressed in the schools' documents at least matches that expressed in the IBPYP scope and sequence documents (IB, 2007).

The MEB curriculum was analyzed to find out environmental components, objectives and activities and also the focus of the environmental curriculum.

Although there is some research on environmental education in Turkey (Berberoglu & Tosunoglu, 1995; Yilmaz et al., 2004; Alp et al., 2008) there was not enough data that shows environmental objectives, skills, and values in the MEB. The elementary curricula that have been taught in the schools in Turkey needs to be explored to find out whether they contain suitable skills, values, and beliefs are deep enough to lead to action toward preserving the environment.

In this research, the chosen curricula were analyzed in three steps:

1. Number of environmental objectives: Five curricula were analyzed to determine the number of environmental objectives and percentage of environmental objectives out of the total number of objectives in the analyzed curricula. The number of environmental objectives and their percentage to all of the learning objectives in the curriculum indicates to what extent the curricula comprise and emphasize the environmental education. Some key words such as *environment*, *sustainable development*, *recycle*, *reduce*, *reuse* were identified in all of the objectives in order to separate environmental objectives from the other objectives in the curriculum.

2. Frequency of environmental vocabulary in each curriculum: It was considered that the frequency of environmental words indicates the focus of the content within the environmental objectives in the curriculum because that would indicate what is taught to the students in a certain amount of time. Pleasant et al. (2001) researched literature of “environmental communication” in order to find out the key words that take place in environmental literacy. According to Pleasant et al. (2001) there are specified keywords covering environmental communication topics in the social science journal literature from relevant indices. *Environment*, *environmental*, *nature*, *renewable* was some of the key words researchers found in the literature. These words were included in the analysis of the frequency of environmental terminology. Because this research aims to determine action-based objectives and activities, *action*, *active*, *participation*, *sustainable development* was included for this analysis.

3. Type and number of environmental activities in the curricula: The five curricula were analyzed to determine the number and type of environmental activities in each

one of them. It was expected that the number of certain type of activities would support the result of the first and second steps of the analysis. They would show us the emphasis of the curriculum and how environmental it is. The activities were analyzed under four titles: raising awareness, critical thinking, action-based activities, and research-based activities. These categories come from two sources: UNEPMS and the purpose of this research. According to Hungerford's et al. (1980) definition of environmental education in the UNEPMS curriculum, environmental education must develop skilled problem solvers and should be concerned with the quality of human life and a quality environment which are embedded in sustainable development. According to this definition (UNEP, 1994) environmental education requires students to interact with the environment independently and to assess their own impact on the environment using critical thinking skills. The activity types were chosen to be able to determine if the curricula include certain kinds of activities that allow students to acquire certain skills that would empower them to be more active, independent and participatory e.g. problem solving skills and analytical skills. The type of the environmental activity indicates what kind of activities is valued in the environmental instruction.

Results related to curricular analysis and comparison

Number of environmental objectives in each curriculum

In order to determine the number of environmental goals and the ratio of environmental objectives to the total number of objectives, each curriculum was examined to collect quantitative data under each category. Quantitative data is gathered and shown by the tables (Table 1).

Table 1 lays out the total number of objectives and the number of environmental objectives in each curriculum. The third column of Table 1 indicates the ratio of environmental objectives to the total number of objectives expressed by percentages.

All of the objectives are environmental objectives in the UNEPMS curriculum. Some key words related with the environment such as *environment, sustainable development, recycle, reduce, reuse* scanned in all of the objectives in the OEC, BNC, MEB and IBPYP curricula to determine which objectives were directed at environmental education. After the analysis of number of environmental objectives, their ratio to total number of objectives was calculated and shown in Table 1.

Table 1 was ordered to see trends more easily according to the highest number of environmental objectives to the lowest number of environmental objectives.

Table 1

Number of environmental objectives in each curriculum

	TOTAL NUMBER OF OBJECTIVES	NUMBER OF ENVIRONMENTAL OBJECTIVES	PERCENTAGE OF ENVIRONMENTAL OBJECTIVES
United Nations Environmental Education Curriculum for Middle Schools (UNEPMS) (All subject areas grade 6-8)	24	24	100 %
International Baccalaureate Primary Years Programme (IBPYP)	627	107	17.06 %
Science Scope & Sequence (Grades PreK-5)	173	53	30.63 %
Social Studies Scope & Sequence (Grades Prek-5)	245	54	22.04 %
Ontario Environmental Curriculum (OEC) (All subject areas Grades K-5)	2539	195	7.60 %
The Turkish Ministry of National Education Curriculum (MEB) (All subject areas from Grade K to Grade 5)	3275	88	2.68 %
<i>Life Science</i> (Grades 1-3)	292	26	8.90 %
Grade 1	-	6	23 %
Grade 2	-	9	34 %
Grade 3	-	11	42 %
Science & Technology (Grades 4-5)	374	44	11.76 %
Grade 4	-	28	63 %
Grade 5	-	16	36 %

Table 1 (Continued)

Number of environmental objectives in each curriculum

	TOTAL NUMBER OF OBJECTIVES	NUMBER OF ENVIRONMENTAL OBJECTIVES	PERCENTAGE OF ENVIRONMENTAL OBJECTIVES
Social Studies (Grades 4-5)	92	18	19.56 %
Grade 4	-	10	55 %
Grade 5	-	8	44 %
British National Curriculum (BNC) (All subject areas for Key Stage 1 & 2)	927	22	2.37 %
Science curriculum (Key Stage 1 & 2)	132	8	6.06 %
Personal, Social & Health Education (Key Stage 1 & 2)	75	5	6.66 %
Geography(Key Stage 1 & 2)	53	9	16.90 %

*Due to rounding of percentages each column may not be 100 %

All of the objectives in the UNEPMS curriculum were environmental objectives (100 % from Table 1) and they are fully integrated into all subject areas (UNEP, 1994).

Thus it can be concluded that the UNEPMS is a complete environmental curriculum.

The UNEPMS was first published in 1989 and was presented as a prototype for an environmental education curriculum (UNEP, 1994). The UNEPMS also presented some additional important materials i.e. instructional resources, and teacher training related with the environmental education for the middle school. It was revised in 1994 in order to update it and incorporate into new and important environmental education concepts i.e. sustainable development and environmentally literate global citizen. It is thus presented as a prototype around which a team of educational planners can make intelligent decisions about what their own curriculum should appear (UNEP, 1994). When UNEPMS is reviewed from this perspective, it is

expected to contain 100 percent environmental objectives. It lends itself as an ideal curriculum for any researcher or curriculum expert to use in the creation and implementation of an environmental curriculum (UNEP, 1994).

In the IBPYP curriculum, environmental objectives make up 17.06 % of the whole curriculum. Most environmental objectives were in the science scope and sequence curriculum. In the science scope and sequence document, there are two science strands that include all the environmental objectives: living things and earth and space. Living things is the study of the characteristics, systems, and behaviours of humans and other animals and plants; the interactions and relationships between and among them within their environment. Earth and space is the study of planet the Earth and its position in the universe, particularly its relationship with the Sun; the natural phenomena and systems that shape the planet and the distinctive features that identify it; the renewable and non-renewable resources of the planet (IB, 2007).

Although the IBPYP does not present itself as an environmental curriculum, action is one of the essential elements and responsibility of the main attitudes within a curriculum. Thirty percent of the science curriculum is formed by environmental objectives. According to Table 1 this is the second highest ratio of 17.06 % after UNEPMS. It can be concluded that the IBPYP curriculum lends itself as a curriculum that emphasises the importance of environmental education. The objectives in science lend themselves to care for the environment, how we can learn about it, show respect, and responsibility and make a difference on earth. The curriculum also includes thinking and research skills which lead students to action. However, the percentage of objectives to the whole curriculum is very limited.

Although the IBPYP gives a framework to the schools and leaves the main focus to the school, the framework could have been more environmentally based. The schools can choose what units to study according to their national curriculum in order to meet national requirements. If the national requirements are not environmentally friendly then the IBPYP units would lack environmental content. A more clearly defined and environmental based framework would help the IBPYP schools to develop more environmentally based curriculum.

In the British National Curriculum, environmental objectives make up 2.37 % of the whole curriculum (Table 1). When compared to the other curricula, the BNC has the lowest percentage of environmental objectives of the studied curricula.

According to Table 1, in the BNC curriculum, the highest number of environmental objectives is in the area of geography with a percentage of 16.9 %. In geography, the environmental objectives aim to teach recognition of changes in the environment and ways to improve and sustain the environment. These objectives aim to teach students to be responsible citizens who take action towards solutions. Environmental objectives integrated into the geography instruction start in Key stage one and continue until the end of Key stage three which corresponds to ages of five thru fourteen. In this study, Key stage one and Key stage two objectives were analyzed which corresponds to ages five to eleven. We can thus say that students begin learning about the environment in their formal education at an early age. In the science curriculum the number of environmental objectives is 132 and makes up 6.06 % of the BNC.

In science instruction for Key stages one and two, environmental objectives are incorporated in learning about living things in the students' environment and how they

can care and protect the environment which hopefully might lead students to take action. This result implies that although the numbers of environmental objectives are limited, they aim to teach responsibility and action which requires some level of knowledge as well.

In Personal, Social & Health education for Key stages one and two in the BNC, environmental objectives are about how to be a good citizen, some facts about causes of damage to the environment, how students can improve and sustain the environment, and how to participate in the solutions to environmental issues. Table 1 indicates that environmental objectives in Personal, Social & Health education make up 6.66 % of the curriculum.

According to the Table 1, the ratio of the environmental objectives to the whole curriculum in the BNC seems very limited but it starts in a very early age and aim students to gain some certain knowledge by action-based activities. Students in Britain start their formal environmental education at the age of five by taking the mentioned subjects which might lead them to be aware of environment and its issues earlier.

According to Davis (2009), early childhood years are regarded as the foundation upon which the rest of their life is constructed. As the environmental education starts earlier students would be more knowledgeable and skilled about the environment and its issues as they grow.

In the MEB curriculum, the percentage of environmental objectives in the whole curriculum is 2.68 % (Table 1). This ratio places the MEB curriculum the second lowest after the BNC. The highest number of environmental objectives in the MEB

curriculum was placed in the science curriculum (44 objectives out of total number of 88 objectives). Social studies curriculum for grades four and five has the highest ratio of environmental objectives at 19.56 %. Although social studies curriculum has the highest number of environmental objectives, it only included 92 objectives of which 18 were environmental objectives. Within the social studies curriculum grade four has 55 % of the environmental objectives while this percentage decreases to 44 % in grade five.

The environmental objectives in the social studies curriculum address environmental awareness. In the science curriculum (grades four and five) the percentage is even lower (11.76 %) and the emphasis is on environmental awareness and not on taking action, direct natural activities, or critical thinking. The distribution of environmental objectives in the science curriculum indicated that the number of environmental objectives in grade four science curriculum (63 %) is higher than the number of environmental objectives in grade five (36 %).

The objectives aim to give certain knowledge about the environment and the interconnectedness between humans and the environment but do not aim to teach action, sustainable development, and problem solving skills. The total number of the environmental objectives in the social studies and science for grades four and five make up to 62 (70 %) out of total number of 88 environmental objectives in the MEB curriculum. Grade four had 38 (61 %) of the environmental objectives within total number of 62 objectives while grade five had 24 environmental objectives (39 %). It can be concluded that grade four had the highest number of environmental objectives in the social studies and science curriculum for elementary. In *life science* for

grades one to grade three there are 26 environmental objectives which make up only 8.90 %. Grade three had 11 (42 %) of the environmental objectives while grade two had nine (34 %) and grade one has six (23 %) of the environmental objectives in life science curriculum. It can be seen that grade four comprises the highest number of environmental objectives within grades one through five while grade one comprises the lowest number of environmental objectives. Because the number of environmental objectives in the whole curriculum is limited (2.68 %) it can also be said that the focus of the MEB curriculum is not on environmental education during the early years but environmental education was emphasized more as students moved upper grades in the *life science* curriculum.

Classification of MEB environmental objectives

Environmental objectives in the MEB curriculum were classified under types of objectives in order to obtain more detailed data to analyze. Table 2 below presents the distribution of all of the environmental objectives under these certain types: raising awareness, critical thinking, action-based, and research-based objectives. Raising awareness objectives aim at transmission of knowledge and expect students to reach to a certain level of learning and understanding of the content. Critical thinking objectives aim at students to develop higher order thinking skills such as analysis and evaluation. Action-based objectives intend to lead students to take action by teaching the content in the nature, in the field and by teaching real life skills. Research-based objectives target to lead students to be inquirers and develop certain skills to conduct a research.

Table 2:

Classification of environmental objectives in the MEB curriculum

	Raising awareness (knowledge based; understanding, remembering)	Critical thinking, problem solving (discussions, opportunities to abstract, analyze, make critical judgments, evaluation)	Action-based objectives (hands on, in nature, in the field, action plans, real life applications)	Research-based objectives (issue investigation, questionnaires, surveys, stages of a research)	Total number of objectives
The Turkish Ministry of National Education Curriculum (MEB)	57	6	8	17	88
<i>Life Science</i> (Grades 1-3)	15	1	2	8	26
Science & Technology (Grades 4-5)	29	2	4	9	44
Social Studies (Grades 4-5)	13	3	2	0	18

In the MEB curriculum, the highest number of environmental objectives distributed under raising awareness objectives. “Explains light pollution”, “understands difference between natural and artificial nature” and “knows the names of the natural places and historical sites around himself/herself” can be given as examples to objectives related with raising awareness in the MEB curriculum. The highest number of raising awareness related objectives take place in the science curriculum for grades four and five (29 activities out of total number of 57 activities) while lowest number of raising awareness objectives can be found in the social studies curriculum for grades four and five (13 objectives out of total number of 57).

The second highest environmental objective type is research-based objectives in the MEB curriculum. “Makes a research about light pollution and presents results using different media” and “research in what ways humans can be wise consumers” can be given as examples of objectives that target to teach research. It can be seen that objectives related with research take the highest place in the science curriculum (nine objectives out of total of 17). There are not any objectives in the social studies curriculum related with research. Although the highest number of environmental objectives takes place in the science curriculum (44 objectives out of total of 88) most of these objectives aim to raise awareness. *Life science* for grades one to three comprises eight of the research related objectives out of a total of 17.

Action-based objectives are the third highest number of objectives in the MEB curriculum. “Uses natural resources carefully at home”, “uses technological resources without harming the environment” and “warns others who harms the environment” can be given as examples to objectives aim to teach action.

The highest number of environmental objectives related with action takes place in the science curriculum (four objectives out of total number of eight). The number of objectives regarding action is the same in the *life science* and the social studies curriculum (two objectives out of eight).

In the MEB curriculum the lowest number of environmental objectives are critical thinking objectives (six out of 88). “Develops a perspective about NGOs role in humans’ life” and “compares differences in a habitat that he/she observes” are examples of objectives that teach critical thinking in the MEB curriculum. Social studies curriculum includes the highest number of objectives target critical thinking

(three objectives out of total number of six) while *life science* includes the lowest number of objectives related with critical thinking (one objective out of six). It can be concluded that the MEB curriculum puts more focus on teaching higher order thinking skills in older grades than in early grades.

In the next tables, subject areas of *life science*, social studies and science which include all of the environmental objectives in the MEB curriculum will be analyzed separately in order to obtain more detailed data from each subject area.

Table 3
Classification of environmental objectives in MEB life science curriculum

	Raising awareness (knowledge based; understanding and remembering)	Critical thinking, problem solving (discussions, opportunities to abstract, analyze, make critical judgments, evaluation)	Action-based objectives (hands on, in nature, in the field, action plans, real life applications)	Research-based objectives (issue investigation, questionnaire, surveys, stages of a research)	Total number of objectives
	13	1	3	9	26
Grade 1	4	0	0	2	6
Grade 2	4	0	2	3	9
Grade 3	5	1	1	4	11

Life science curriculum for grades one through three aims to develop happy students who are enthusiastic about learning and care about themselves, society, and the natural environment those they live in. The main goal of the *life science* is to deliver basic knowledge to students that they would need in their daily life (TTKB, 2005).

Life science curriculum includes 26 environmental objectives of the total number of

88 environmental objectives in the MEB curriculum. The highest number of environmental objectives can be found in grade three (11 objectives out of total number of 26 objectives) while grade one had the lowest number of environmental objectives (six objectives out of total number of 26 objectives). Thirteen of 26 environmental objectives in the *life science* curriculum aim to teach raising awareness. “Understands the relationship between keeping environment clean and his/her own health” and “explains differences between natural and artificial environment” can be given as examples of raising awareness objectives in the *life science* curriculum. Although it might seem 13 raising awareness objectives distributed evenly within grades one, two, and three; grade three had the highest number of raising awareness objectives (five objectives out of total number of 15). Grade two and one had the same number objectives related with raising awareness (four objectives out of total number of 15).

The second highest number of environmental objectives in the *life science* curriculum is research-based objectives. “Design a project to clean his/her environment” and “research in what ways humans can consume wisely” are some examples of environmental objectives aim to teach research, investigation and inquiry. Most of the objectives related with research can be seen in grade three (four objectives out of eight) while three of the research-based objectives can be found in grade two and two of them are in grade one.

Action related objectives and critical thinking related objectives are very limited in the *life science* curriculum. There are three objectives related with action in the *life science* curriculum. Two of them take place in grade two while grade three has one

action-based objective. These objectives are “finds solutions to conserve environment” (grade two), “consumes resources at home wisely” (grade two) and “uses resources wisely during personal care” (grade three). There are no objectives in grade one that aims to teach action. One critical thinking objective exists in *life science* curriculum and it is in grade three. “Knows his/her rights as a consumer and acts considering them”. It can be said that objectives related with raising awareness take the highest priority in the *life sciences* curriculum while the focus is not on action-based instruction.

Table 4
Classification of environmental objectives in the MEB science curriculum

	Raising awareness (knowledge based; understanding and remembering)	Critical thinking, problem solving (discussions, opportunities to abstract, analyze, make critical judgments, evaluation)	Action-based objectives (hands on, in nature, in the field, action plans, real life applications)	Research-based objectives (issue investigation, questionnaires, surveys, stages of a research)	Total number of objectives
	29	2	4	9	44
Grade 4	17	1	3	7	28
Grade 5	12	1	1	2	16

The science curriculum in the MEB aims to develop literate students in science and technology who have relevant skills, attitudes, values, understanding, and knowledge to do research, criticize information, solve problems, and make informed decisions. Science curriculum comprises 44 objectives out of total number of 88 environmental objectives in the MEB curriculum. It can be said that science for grades four and five

included the highest number of environmental objectives in the MEB curriculum. Grade four had the most (28 objectives out of total number of 44) environmental objectives in the science curriculum. The highest number of the objectives in the science curriculum was objectives that target teaching raising awareness (29 objectives out of total 44). “Gives examples of endangered animals and plants in his/her country” and “can separate natural and artificial materials” are some examples of raising awareness objectives. Seventeen of the 29 raising awareness related objectives can be found in grade four while 12 of them are in grade five. It can be stated that environmental information was aimed to deliver raising awareness more in grade four science curriculum than in grade five.

Second highest environmental objectives in the MEB science curriculum were research related objectives. Some examples of research-based objectives in science are “gathers data about the environmental issues in close environment and country and presents the data” and “researches precautions to prevent land, air and water pollution”. Grade four comprises seven out of total of nine research-based objectives in science while grade five comprises two of them. It can be said that although most of the raising awareness related objectives take place in grade four science curriculum, significantly higher number of research related objectives take place in grade four as well. It can be seen that there were four objectives related with action in the MEB science curriculum. Three of the four objectives take place in grade four while one of them can be found in grade five. Action related objectives in grade four within the science curriculum are “develops simple methods to clean his/her environment”, “participates voluntarily to conserving environment activities”, and “gains responsibility to conserve and improve the environment”. The one objective

related with action in grade five is “warns others who harms the environment”. It can be concluded that action related objectives in grade four aimed to teach being active and participatory action towards the conservation of the environment while students in grade five were being encouraged to warn and inform others. There are two objectives that aim to develop critical thinking skills were distributed evenly in the grades four and five science curriculum. In grade five, the critical thinking related objective is “compares differences and similarities between living things in a habitat” and in grade four “develops ideas to solve light pollution issue”. Critical thinking objectives were the lowest number of environmental objectives in the MEB science curriculum.

Table 5
Classification of environmental objectives in MEB social studies curriculum

	Raising awareness (knowledge based; understanding and remembering)	Critical thinking, problem solving (discussions, opportunities to abstract, analyze, make critical judgments, evaluation)	Action-based objectives (hands on, in nature, in the field, action plans, real life applications)	Research-based objectives (issue investigation, questionnaires, surveys, stages of a research)	Total number of objectives
	13	3	2	0	18
Grade 4	6	2	2	0	10
Grade 5	7	1	0	0	8

Social studies in the MEB curriculum for grades four and five aimed to develop productive and active students who understand Turkish history, culture, and scientific methods of social studies but also have basic democratic values, social skills and are

respectful of human rights and the environment (TTKB, 2005).

There were 18 environmental objectives in the social studies curriculum (18 objectives out of total 88 environmental objectives). Thirteen of these objectives were aiming to raise awareness by transferring knowledge for understanding. It can be said that raising awareness related environmental objectives were distributed evenly in grades four and five, while there are seven in grade five and six in grade four. “Knows the names of the natural places and historical sites around himself/herself” and “understands human actions that increase natural disasters in his/her region” are some examples of raising awareness objectives in the social studies curriculum.

Although critical thinking related objectives in the social studies curriculum seem to be the second highest objective type in social studies, the number of objectives related with critical thinking were significantly lower (three out of total number of 18) compared to the raising awareness objectives in the social studies curriculum (13 raising awareness objectives out of total number of 18). Two of the objectives that target teaching critical thinking take place in grade four while one of that kind of objective can be found in grade five. These objectives in grade four are “observes natural events in his/her environment and puts them in graphs for analysis” and “evaluates products that he/she wants to buy according to determined standards”. The objective related with critical thinking in grade five was “develops a perspective about the role of NGOs in human life”.

There are two action related objectives in the social studies curriculum that take

place in grade four. Action related objectives cannot be found in the grade five social studies curriculum. Objectives regarding action in grade four social studies curriculum are “uses technological products without harming others” and “is prepared for natural disasters”. It can be said that although it is in the social studies curriculum vision to develop active students the action-based environmental objectives are limited in this subject area.

According to the analysis of research-based objectives, there is no objective related with research, investigation and inquiry within the social studies environmental objectives. This result also conflicts with the vision of the social studies curriculum which aims to develop students who understands scientific methods of social studies.

Frequency of environmental vocabulary

Each curriculum was analyzed to determine how many times certain words related with the environment appeared within the document. Frequency of environmental vocabulary gives us an indication of the main focus in a certain curriculum. The results tell us about the content, main concepts and ideas that students are taught during their education of the environment. Table 6 describes the frequency of some vocabulary related with the environment.

Table 6
Frequency of environmental vocabulary

	Environment	Environmental Awareness	Sustainable Development	Responsible/Responsibility	Renewable	Resources	Active (i.e.c)*	Action (i.e.c)*	Issues (i.e.c)*	Skills (i.e.c)*	Participation	Environmental Understanding	Nature/Natural (i.e.c)*
United Nations Environmental Education Curriculum for Middle Schools (UNEPMS) 1253	401 (32 %)	27 (0.02 %)	85 (0.06 %)	40 (0.03 %)	13 (0.01 %)	79 (0.06 %)	4 (0.02 %)	227 (8 %)	195 (15 %)	102 (8 %)	5 (% 0,3)	9 (0.07 %)	66 (0.05 %)
Ontario Environmental Curriculum (OEC) 584	330 (56%)	6(0,010 %)	7 (0.18%)	4 (0.6 %)	5 (0.12%)	30 (0.05%)	12 (0.20 %)	18(0.030 %)	30 (0.05 %)	34 (0.05 %)	10 (0.17 %)	32 (0.05 %)	66 (11%)
British National Curriculum (BNC) 103	37 (35 %)	0	7 (0.6 %)	10 (0.9 %)	0	3 (0.2 %)	3 (0.2%)	2(0.02 %)	14 (13 %)	3 (0.2 %)	3 (0.2 %)	15 (14 %)	6 (0.5 %)
Science (Key Stage 1 & 2)	14(37 %)	0	1 14 %)	0	0	0	0	0	2 (14 %)	2 (75 %)	2 (75 %)	0	3 (50 %)
Geography (Key Stage 1 & 2)	17(45 %)	0	4 (57 %)	0	0	1(25 %)	0	0	4 (28 %)	0	0	9 (60 %)	1(16 %)
Personal, Social & Health Education (Key Stage 1 & 2)	6 (16 %)	0	2 (28 %)	10 (100 %)	0	2 (75 %)	3 (100 %)	2 (100 %)	8 (57 %)	1(25 %)	1 (25 %)	6 (40 %)	2 (34 %)
The Turkish Ministry of National Education Curriculum (MEB) 699 <i>Life Science</i> Social studies Science	255 (36 %)	95 (13 %)	0	43 (0.6 %)	1 (0.014 %)	105 (15 %)	21 (0.3 %)	12 (0.17 %)	18 (0.2 %)	38 (0.5 %)	25 (0.3 %)	1 (0.014 %)	85 (12 %)

Table 6 (Continued)
Frequency of environmental vocabulary

	Environment	Environmental Awareness	Sustainable Development	Responsible/Responsibility	Renewable	Resources	Active (i.e.c)*	Action (i.e.c)*	Issues (i.e.c)*	Skills (i.e.c)*	Participation	Environmental Understanding	Nature/Natural (i.e.c)*
Social Studies (grades 4-5)	10 (0.030%)	4 (0.042%)	0	1 (0.023%)	0	1(0.09%)	0	0	4 (22%)	0	6 (24%)	0	13 (15%)
Science & Technology (grades 4-5)	154(60%)	31 (32%)	0	10 (23%)	1(100%)	21 (20%)	11(53%)	12(100%)	9 (50%)	5 (13%)	13 (52%)	1(100%)	40 (47%)
Life Science (grades 1-3)	96 (37%)	60 (63%)	0	42 (97%)	0	83 (79%)	10 (47%)	0	5 (28%)	33 (87%)	6 (24%)	0	32 (37%)
International Baccalaureate Primary Years Programme (IBPYP)385 (Science & Social studies)	116 (30%)	4 (0.10%)	8 (0.20%)	32 (0.80%)	2 (0.50%)	41 (10%)	5 (0.01%)	12 (0.30%)	8 (0.20%)	8 (0.20%)	1 (0.02%)	33 (0.80%)	115 (29%)
Science	43 (37%)	1(25%)	5 (60%)	16 (50%)	2 (100%)	14 (34%)	2 (40%)	5 (40%)	5 (62%)	4 (50%)	0	18 (55%)	75 (66%)
Social Studies	73 (53%)	3 (75%)	3 (40%)	16 (50%)	0	27 (66%)	3 (60%)	7 (60%)	3 (38%)	4 (50%)	1 (100%)	15 (45%)	40 (34%)

*i.e.c: In environmental context

Out of the keywords selected, each curriculum had *environment* as the most frequent word. *Environment* makes up 32 % of UNEPMS, 56 % of OEC, 35 % of BNC, 36 % of MEB, and 30 % of IBPYP (Table 6). In order to have a better understanding of the main emphasis of the curriculum other frequent words need to be analyzed.

It can be seen at the first row of Table 6, the frequency of environmental vocabulary of the UNEPMS. Total number of the words is 1,253. The most frequent word is *environment* which appeared 401 times in the curriculum (32 %). This was expected because the UNEPMS is a fully integrated environmental curriculum. The second most frequent word in the UNEPMS is action. *Action* was used in the entire curriculum 227 times (18 %). It can thus be concluded that the main focus of the UNEPMS is taking action, participating in real-life environmental activities such as nature excursions, examining local environment in order to find out how environmentally friendly students' life, and their positive and negative impact on the Earth. It can be inferred that the UNEPMS is an environmental curriculum which emphasizes the importance of action to solve environmental issues. However, when we look at *participation* which goes along with the *action*, it only appears 5 times (0.3 %) in the whole curriculum. It is important students learn the environmental terminology such as *participation* and *responsibility* beside *action* while they are learning about the environment. They are the ones who will take action, who will protect the environment therefore they should be exposed and taught the environmental terminology when they need to argue, defend, and protect the environment in any platform. It would be expected *participation* to be one of the most frequent words with *action* in the UNEPMS.

The UNEPMS indicated the word of *action* as the primary vocabulary for moving forward and actively working towards an environmental goal. However, it is hard to come to the same conclusion for the word *active*. It appears only 4 times (0.3 %) in the curriculum and the context presents that *active* implied active involvement in environmental action. This result appears to conflict with the most frequent words.

Because the UNEPMS aims to teach students problem solving and thinking skills that would lead them to take action, it would be expected that the *action* is one of the most frequent word. The analysis of the activities (Table 7) will give further data to make a conclusion about the role of action in the UNEPMS curriculum.

Issues is the third most frequent word used in the UNEPMS curriculum (15 %).

“Issue awareness, issue investigation and resolution” is one of the basic strands in the curriculum which implies that the UNEPMS is an environmental curriculum that aims to teach students to be aware of the issues related with the environment, investigate the best ways that would lead them to take an action towards finding solutions to the environmental issues.

Environmental skills was the fourth most frequent word (8 %) which supports the UNEPMS aims to develop higher level thinking skills in students which would lead them to be active participants and problem solvers. It can be seen that in the examination of the curriculum, environmental skills are problem solving skills such as problem identification, evaluation, and implementation of environmental actions; investigative skills, evaluative skills, action skills, and critical thinking skills. The UNEPMS encourages students to experience the environment which allows them to discover how they interact with the environment themselves.

Environmental awareness (0.02 %) and *environmental understanding* (0.07 %) are two of the less frequent words used. This is inevitable and expected in an action-based curriculum. It implies that the curriculum gives students some basic knowledge and understanding of the environment but the main focus is on taking

action. However, the other less frequent words like *active* (0.3 %) and *renewable* (0.10 %) clearly indicated that even the UNEPMS curriculum which was developed as a full environmental curriculum is lacking in environmental terminology, e.g. renewable, sustainable development. Renewable energy sources are the main solution for the current energy sources that are running out rapidly. It is an important need that students know about *renewable* energy sources and related solutions to environmental problems (Kepenek, 2011). He claimed that the concept of renewable energy is now at the heart of environmental and energy debates because of it can be considered as constantly self renewing and also less polluting than the other energy systems. This need and knowledge seems lacking in the UNEPMS curriculum.

In the Ontario Environmental Curriculum (OEC) the most frequent word is also environment (56 %). It appears more often than in the UNEPMS (Table 2). The frequency of some other key words gives a deeper understanding of the emphasis of the curriculum. The second most frequent word in this curriculum is nature (11%). The context in which this word appears indicates that *nature* appears in activities, observations, experiments, excursions including nature in art classes. It implies that the main focus of the OEC is the environment and letting students explore and learn about the natural environment.

The less frequent words in the OEC were *sustainable development* (0.18 %) and *responsibility* (0.60 %). Unfortunately, it appears that this curriculum introduces students to the environment and nature but does not give opportunities to learn about how to take responsibility and act towards the solutions to save and protect the environment. Sustainable development is one of the most important concepts like

renewable that lend itself one of the main solutions to environmental issues (Kepenek, 2011). However, the OEC only introduces these concepts to the students very briefly. *Renewable* appears only five times in the whole curriculum (0.12 %) which supports the same interpretation as above.

Action-based vocabulary appears to be lacking as well in the OEC curriculum. *Participation* appears 10 times (0.17 %), *action* 18 times (0.30%) and *active* 12 times (0.20 %). In contrast to the strands and frequent words in the UNEPMS which implies that its aim is to teach students to be active participants in order to find solutions to environmental issues. The main focus of the OEC is teaching students about the environment and nature but actively participating in the environmental solutions and activities do not appear as the main focus.

Although OEC presents itself as a complete environmental curriculum and the *environment* is the most frequent word in the curriculum, the analysis of the appearance of other words such as sustainability, renewable, action, resources, and participation show that the emphasis is on the knowledge of environment rather than taking action and participation. Although, UNEPMS is a curriculum for older ages compared to OEC, it is suggested that students who start to learn relevant skills in early ages with direct activities in the nature would be empowered to be active citizens (Hart, 1997; Short, 2010).

All of the environmental objectives in the British National Curriculum (BNC) are in the geography, science and personal, social, and health education subject areas. Table 2 presents the most frequent word related to environmental education was again

environment and which appeared 37 times in the BNC curriculum (35 %). The next most frequent words in the BNC were *environmental understanding* (14 %) and “issues” (13 %). *Issues* appear to take place in a context that requires students to determine some environmental issues. Table 2 shows that it can be said that the BNC neglects some important concepts in environmental education such as *renewable*, *action*, *nature* and *sustainable development*. *Renewable* does not exist in the environmental objectives of the BNC.

Action appears only twice and makes up 0.19 % of all of the environmental objectives in BNC curriculum. *Sustainable development* (0.6 %) and *nature* (0.5 %) were the other less frequent words in the BNC. This implies that the emphasis of the curriculum is on teaching about the environment then establishing a foundation of environmental awareness and knowledge. However, the focus of the content in the BNC appears to neglect action and participation In the UNEPMS, *renewable* appears 13 times (0.10 %), and in OEC five times (0.8 %). Although the number of appearances of *renewable* is not high even in this curriculum, it is important that they begin to introduce this concept to the students. Having *renewable* not exist in the BNC (Table 2) implies that the BNC is thus lacking of a very important concept that appears as one of the main sustainable solutions to environmental problems.

In Turkey’s MEB curriculum, the most frequent word is also *environment* which appears 255 times in the curriculum and makes up to 36 % (Table 6). The word *environment* mostly appears in the science curriculum for grades four and five (60 %). In Table 6, it can be seen that the concept of environment is taught more in the fourth and fifth grades than in earlier grades and is taught as *life science* objectives.

Environment makes up to 37 % in the early grades while it makes up to 64 % in grades four and five. This implies that the environment is not taught in a satisfactory level in the earlier grades and this is one of the weaknesses of the MEB environmental education because environmental skills and knowledge should start in early ages (Tilbury, 1995; Wilson, 1996; Davis, 2009). In the MEB curriculum, the second most frequent word is *resources*, which shows up 105 times, making up 15 % (Table 6) and lends itself to be one of the key words in the curriculum. *Resources* appear most in the *life science* curriculum with 79 % (83 out of 105). The context of *resources* in the *life science* curriculum for the grades one through three shows that this word appeared to emphasizing the knowledge of renewable resources and how students understand and conserve renewable resources.

The third most frequent word in the MEB curriculum is “environmental awareness” which makes up to 13% (Table 6). It mostly appears in the early grades objectives (63 %). This implies that environmental education in the MEB curriculum in the early years aims at giving students’ knowledge about resources, the environment, and being aware of the environment.

Nature makes up 12 % of the environmental objectives in the MEB curriculum which lends itself as the forth most frequent word (Table 6). However, it mostly appears in the science objectives for the fourth and fifth grades (47 %) and it seems like it is not taught explicitly in the early years like in the older grades.

According to Table 6, the least frequent words in the MEB curriculum were *renewable* (0.14 %), *environmental understanding* (0.14 %) and *action* (0.17 %). The word *sustainable development* does not appear in the MEB curriculum. This result

indicates the same lack of content situation as it was determined in the BNC and the OEC which is crucial for an action-based curriculum which exists in the MEB as well. Most frequent and less frequent words in the MEB curriculum implies that the emphasis of environmental education is on theoretical knowledge of the environment and resources but does not foster *action* (0.17 %). It can be concluded that low frequent words indicated that environmental education in the MEB curriculum is lacking the components of an action-based curriculum.

In the IBPYP, two words stand out as the most frequent words: *Environment* (30%) and *nature* (29 %). These two words make up to 59 % of the frequency of the words. This result implies that the IBPYP emphasizes the importance of the environment and nature in education. In the IBPYP nature is one of the main concepts that is taught in social studies and the science curriculum. The focus of the curriculum is on students' understanding of the local environment, living things in the environment, and the ways in which to sustain the environment (IB, 2007). Investigating the local environment, understanding the connection between human and the environment and characteristics of the living things might lead students to understand the vital relationship between the nature and humans, which could lead students to be more active participants of environmental action and furthermore to be active in finding solutions to the environmental issues.

The third most common word is *resources* (10 %). When this is examined, the context *resource* can be seen that the objectives are knowledge about the finite resources, and how we share and conserve them. *Environmental understanding* and *responsibility* were the next frequent words in the curriculum (16 %). Both words

appear in the context of encouraging students to reach for a better understanding and to take responsibility that leads to action. However, *action* is one of the less frequent words in the IBPYP curriculum (Table 6). It appears only 12 times and makes up 3 % (Table 6). Although some objectives mention the importance of environmental understanding and responsibility that lead to action, action is not explicitly taught in the IBPYP and the focus of the content is not on action.

According to Table 6, the other less frequent words were *sustainable development* (0.020 %), *renewable* (0.05 %) and *participation* (0.02 %). According to Pleasant et al. (2001), *sustainable development* and *renewable* are two of the most common environmental words in the literature. These two concepts are at the heart of the environmental debate and have great importance as they are environmental friendly solutions to the renewable energy resources problem (Kepenek, 2011; Piebalgs, 2009). However, Table 6 shows that *sustainable development* and *renewable* were less frequent words (UNEPMS, OEC, IBPYP) or they do not appear in the curriculum (MEB and BNC). It implies that the analyzed curricula (Table 6) lack these concepts and the focus of the content is not on *sustainable development* and *renewable*.

Type and number of environmental activities in the curricula

The types of environmental activities in the studied curricula were analyzed and presented in Table 7. It comprises four kinds of activities: raising awareness, critical thinking, action-based activities, and research-based activities. These categories were allocated to determine what kind of activities make up the greatest part in each curriculum. These categories allow the identification of what extent the curriculum is

knowledge based which aims to raise awareness by transferring knowledge or teaching higher order thinking skills, e.g. critical thinking skills, and investigation or promoting and teaching action-based attitude and behaviour. The analysis of the activities indicates what kinds of activities are valued in the curricula.

All the activities in the four curricula have been analyzed and then placed under one of these categories. The activities in the analysis of the curricula do not add up equally because some activities can be grouped under more than one type. Some of the activities include different steps that aim at teaching different skills and create knowledge and awareness. During the analysis of these activities every different step in an activity is placed under the relevant category. Table 7 is ordered to see trends more clearly according to the highest number of activities to the lowest number of activities.

Table 7:

Type and number of environmental activities in the curricula

	Raising awareness (knowledge based; worksheets, lectures, guest speaker)	Critical thinking, problem solving (discussions, opportunities to abstract, analyze, make critical judgments)	Action-based activities (hands on, in nature, in the field, action plans, real life applications)	Research-based activities (issue investigation, questionnaires, surveys, stages of a research)	Total number of suggested activities
Ontario Environmental Curriculum (OEC)	39 (58 %)	17 (25 %)	5 (7 %)	6 (8%)	67
The Turkish Ministry of National Education Curriculum (MEB)	20 (60 %)	4 (12 %)	3 (9 %)	6 (18 %)	33
Life Science (Grades 1-3)	8	0	1	1	10
Social studies (Grades 4-5)	6	1	0	1	8
Science (Grades 4-5)	6	3	2	4	15
British National Curriculum (BNC)	8 (27 %)	-	17 (58 %)	4 (13 %)	29
United Nations Environmental Education Curriculum for Middle Schools (UNEPMS)	9 (36 %)	4 (16 %)	5 (20 %)	7 (28 %)	25
International Baccalaureate Primary Years Programme (IBPYP)*	3 (23 %)	4 (30 %)	1 (7%)	5 (38 %)	13

*IB PYP does not suggest activities; instead there are some required skills that were defined as activities and will be considered as activity ideas in this research

According to numerous educational researchers (Dewey, 1916, Wilson, 1996; Burgess, 1998; Owens, 2000) direct experiences which can be defined as experiencing the targeted learning goal have a stronger influence in students' learning than indirect experiences which can be defined as transferring knowledge and awareness to the learners by worksheets and textbooks in the classrooms.

Young learners learn best by interacting with the environment, inquiring about the components of the environment, and having a direct interaction with it (Wilson, 1996). According to Wilson (1996) young learners should not be expected to "watch and listen" for any length of time, nor should they be expected to always follow the teacher's lead or agenda. As Dewey (1916) pointed out, education is not only a place to gain content knowledge but also a place to learn how to live. The purpose of education should not revolve around the acquisition of a pre-determined set of skills, but rather the realization of one's full potential by experiencing it and the ability to use those skills in real life for the greater understanding that would lead students to act in real life situations (Dewey, 1916). Such experiences play a critical role in life-long shaping attitudes, values and pattern of behaviour (Tilbury, 1995). Dewey (1916) pioneered project based learning, which is an instructional approach built upon authentic learning activities such as investigating the real life situations, answer and/or ask questions, and solving problems by doing research. Rajecki (1982) argues that project based learning activities that generally reflect the types of learning and activities students do in the everyday world outside the classroom, have stronger influence on students' learning and behaviour. According to Hines et al. (1986) being familiar

with the environmental problems and causes would help students to understand how they should act to decrease their impact on the environmental issues as well as learning to take action toward to find solutions to them. It can be concluded that some degree of knowledge and awareness is essential for elementary students to learn about the environment, however research proves that transferring knowledge and awareness has a very small impact on learning and real life investigation and thinking skills activities would benefit students' learning to be active participants more than knowledge based activities.

The OEC framework emphasizes the necessity of ensuring that young people become environmentally active and responsible citizens (The Ontario Curriculum, 2009). Students need to have the knowledge and skills that will enable them to understand and deal with complex issues that affect the environment now and in the future (The Ontario Curriculum, 2009). Therefore, it would be expected that this curriculum would have more action-based environmental activities and limit the number of raising awareness environmental activities. However, the analysis of types of environmental activities indicates that critical thinking, action-based, and research-based environmental activities together compose only the half of the activities in the OEC. More than half of the activities were raising awareness activities (58 %).

As it is indicated by Hart (1997), Tilbury (1995) and Short (2010) students should be given opportunities to participate and learn by doing starting from early years, therefore high number of raising awareness imply that the focus of the curriculum is not on taking action in the OEC.

In the OEC the total number of environmental activities is 67. Raising awareness activities make up the largest place within environmental activities (58 %). Raising awareness activities aim to teach students being aware of the environment by the activities that take place in the classroom by knowledge transmission by the teacher. “Making a description of the characteristics of a healthy environment, including clean air and water and nutritious food in the classroom”, “explain why it is important for all living things to have a healthy environment after making a description of healthy environment” can be given as examples of raising awareness activities in the OEC. Although the OEC is a fully integrated environmental curriculum which emphasizes the importance and necessity of action in young learners’ education (The Ontario Curriculum, 2009) more than half of the activities aim to transfer knowledge (58 %).

The second largest number of environmental activities were critical thinking activities (19) and make up to 28 % of the activities which is about half that of the number of raising awareness activities. Some examples of critical thinking activities in the OEC are “students assess objects in their environment that are constructed for similar purposes in terms of the type of materials they are made from, the source of these materials, and what happens to these objects when they are worn out or no longer needed (e.g., chairs at home and at school; different kinds of shoes; different kinds of floor coverings)” and “students evaluate ways in which the uses of liquids and solids can have an impact on society and the environment by finding out the ways liquids and solids are used in daily life and assessing how their usage impacts society and the environment”.

Action-based activities make up to seven percent of the curriculum in the OEC.

“Students assess the ways in which liquids and solids in the home are used, stored, and disposed of in terms of the effect on personal safety and the health of the environment by making a list of these in their own home. According to the list they have made, students suggest responsible actions to replace inappropriate practices”.

“Investigating similarities and differences in the characteristics of various animals by doing a research in the library and on the internet and preparing an essay to present in the classroom” and “investigating the ways in which a variety of animals adapt to their environment and/or to changes in their environment, by reading simple non-fiction texts and Aboriginal stories; observing animal activity in the schoolyard and surrounding areas, and record findings” can be given as examples to research-based activities in the OEC. Research-based activities have the second lowest percentage (8 %) before action-based activities in the OEC.

In the Turkish MEB curriculum, a large number of environmental activities are about raising awareness (60%). Total number of the activities is 33 and 20 of them are raising awareness activities. The other types of activities make up a small percentage of the activities as follows; research-based activities 18 %, critical thinking activities 12 % and action-based activities make up to 9 % of all environmental activities that take place in the MEB curriculum. “Students listen to a guest speaker who gives information on health and students’ responsibility on their own and others health. Students ask questions of the guest speaker”, “students classify the living things pictures in the classroom as animals, plants and humans” are some examples of raising awareness activities in the MEB curriculum. The higher number of raising

awareness activities takes place in the life science curriculum.

The second highest number of environmental activities in the MEB curriculum were research-based activities. Research-based activities make up to 18 % in the MEB curriculum (six activities out of 33 environmental activities) “Students research some ways to clean their own environment by asking adults, reading non-fiction resources, and searching in internet. Students design their own project to clean up the environment and present these in the classroom” are examples of a limited number of research-based activities in the MEB. The highest number of research- based activities take in the science curriculum (four out of total number of six research-based activities). It can be seen that there is one research-based activity in life science and social studies curriculum.

Critical thinking and action-based activities were the lowest number of environmental activities in the MEB curriculum. “Students watch a short movie about the negative effects of light pollution and in what ways it can be reduced. After the movie students will be asked to gather some other information about the ways to reduce light pollution. Students will be asked to evaluate the ways he/she watched, read and present his/her idea about the solution” can be given as an example of critical thinking activities. Critical thinking activities encourage students to learn critical thinking skills which would help them to be more critical and analytic thinkers both at home and in school. Developing critical thinking skills in young learners would enable them to gain a different perspective of what is going on around them. It is important to learn about the environment through these types of activities which are enriched by research, critical thinking, and problem solving skills. Three

out of total number of four critical thinking activities take place in the science curriculum while there is one in the social studies curriculum. No critical thinking activities take place in the life science curriculum.

Action-based activities were also limited in the MEB curriculum compared to raising awareness activities. “Students choose an area in the school playground to create a park. They prepare the soil and plant flowers, trees, vegetables considering the geographical conditions. Students take care of the park” and “students will be asked to create a tree planting activity. Students will plan all details of this event by cooperating with each other, parents, and NGOs then apply their plan by planting trees” are examples of action-based activities in the MEB curriculum. Two of the three action-based activities take place in the science curriculum while there is one in the life science curriculum. No action-based activities take place in the MEB social studies curriculum.

The total number of environmental activities is 29 in the British National Curriculum (BNC) for Key stage one and two. Action-based activities take the largest place (58 %). “After students determine a local environment issue, students write to a newspaper about a local issue, how it can be resolved and how humans should act to prevent the environment” and “students make personal plans about looking after the school environment, apply their plan, keep journals about the application of their plan and share their journal with their teachers” can be given as examples to action-based activities in the BNC. The BNC has the highest number of action-based activities in all the analyzed curricula. However, according to Table 7, there are no critical thinking activities in the BNC environmental activities. Raising awareness

activities make up the second larger number of activities (27 %), followed by research-based activities (13 %). “Students understand that living things and the environment need protection by reading about the endangered living things and local environmental issues” is an example of raising awareness environmental activities in the BNC.

Research-based activities have the lowest number of environmental activities in the BNC. Some examples of research-based activities in the BNC are “Students make an observation of traffic pollution in a city centre and research its negative effects on humans; students will prepare a presentation about their findings” and “students make a research about the similarities and differences between local environments and ways in which these affect animals and plants that are found there. Student research non-fiction books, magazines and internet to make their research and create poster to present their findings”.

Although, the numbers of environmental objectives are very limited in the BNC, the direct activities that bring together students with the nature and lead them to take action seem to compensate for the lack of environmental objectives (British National Curriculum, 2011). This explains why British students are active and willing participants to environmental action despite the limited numbers of environmental objectives in the curriculum. However, the lack of critical thinking skills activities is one of the weaknesses of the curriculum.

According to Table 7, it can be seen that the number of activities in each category is fairly balanced in the UNEPMS curriculum. Total number of activities is 25. The

numbers of awareness raising activities were the highest (36 %), followed by research-based activities (28 %). Action-based activities make up 20 percent of the activities. “Making an action plan for solid waste management at their school; students work in groups to create the plan and apply it. They look into alternative disposal methods if necessary” and “convince a friend to recycle aluminium instead of putting it into the normal garbage” can be given as examples of action-based activities in the UNEPMS.

Although the UNEPMS presents itself as an ideal environmental curriculum which encourages action for middle school learners, the raising awareness activities make up the highest number. “Students classify solid waste into four categories on a basis of the materials from which it is composed: organic - Naturally-occurring raw materials derived from living things which will decompose (biodegrade) naturally into simpler materials, e.g., food and yard wastes can be composted; and renewable/recyclable - naturally occurring raw materials derived from a cyclical source such as trees, fish, drinking water, etc. These resources can be replaced with careful management; non-renewable/recyclable - naturally occurring raw materials which are limited in supply and exhaustible and which can be recycled, e.g., motor oil, steel, aluminium. non-renewable/hard to recycle - naturally occurring raw materials which are limited in supply and exhaustible but which are very difficult to recycle, e.g., plastic toothpaste tubes, plastic toothbrushes, plastic milk cartons” are examples of raising awareness activities in the UNEPMS.

The definition of the goal of environmental education in the UNEPMS suggests some important implications (UNEP, 1994). According to the UNEP (1994),

environmental education must ensure to develop skilled problem solvers. Thus, environmental education itself should use a problem solving (inquiry-based) approach. However, Table 7 clearly demonstrates that critical thinking activities take the lowest place in the environmental activities (16 %). An example of critical thinking activities in the UNEPMS is “students analyze the proposed solution to an environmental issue with respect to its consequences (ecological, economic, social, etc.)”.

Although the number of environmental activities are balanced compared to other studied curricula, raising awareness activities take the highest place within the activities (36 %). More critical thinking, research-based, and action-based activities would balance knowledge transmission. The UNEPMS presents itself as a curriculum that promotes action (UNEP, 1994), although having “action” as the second most frequent word (18 %) seems to support this claim but the number of action-based activities seem to conflict with it.

According to Table 7 the largest number of activities in the IBPYP curriculum is research-based activities (38 %). As the IBPYP encourages inquiry, the high number of research-based activities is aligned with the curriculum philosophy (IB, 2007). “Students investigate the responses of plants or animals to changes in their habitats by using a variety of instruments and tools to measure data accurately” and “students explore the role of living things in recycling energy and matter by planning and carrying out a systematic investigation, manipulating variables as necessary” can be given as examples to research-based activities in the IBPYP.

However, the action-based activities make up only seven percent of the activities suggested in the curriculum. IBPYP curriculum is consisting of “essential elements” which establish what students should know, learn and understand. These essential elements are “concepts, attitudes, skills, knowledge, and action”. Although the IBPYP advocates the importance of taking action toward solutions of any issues around us by making it one of the essential elements in the curriculum, action only takes a very small place within a range of suggested activities. One action-based activity in the IBPYP is “students examine and apply ways in which the local community could be improved in relation to the conservation of energy identifying or generating a question or problem”.

Raising awareness (23 %) and critical thinking activities (30 %) seem balanced regarding the total number of activities. An example to raising awareness activities in the IBPYP is “Students are aware of the role of plants in sustaining life (for example, providing oxygen, food) by reading non-fiction books in the library”. An example to critical thinking activity in the IBPYP is “students assess and evaluate renewable and sustainable energy sources (for example, wind, solar, water) in groups and these groups present results of evaluation to the other students in the classroom”. Raising awareness, critical thinking, and research-based activities seem relatively balanced in the BNC, low number of action-based activities (seven %) implies that the IBPYP does not focus on teaching students direct, real life connected and hands on activities.

Action-based activities in all curricula

All action-based activities in all the studied curricula were analyzed separately to investigate further and for detailed analysis. The action-based activities were

categorized according to the definition of the action-based objectives and activities based on the definitions in the UNEPMS curriculum (UNEP, 1994).

Action-based activities can be described as hands on activities that students learn by doing things and where students are directly involved in directing the activity as active participants. Hands on activities can also be related to the use of manipulative materials in practical activities. Action-based activities give students the opportunities to learn based on the experiences and the environment they are exposed. If students are learning about a plant, they go out in nature where the natural habitat of that plant is. Students make written action plans where they describe the steps that they will need to complete a task regarding a real life application. Real life applications or real life learning are the opportunities that allow students to learn and apply skills to engage, deal, and find solutions to everyday issues that they are experiencing in their school, home, neighbourhood, city and country.

Citizenship action in the UNEPMS curriculum (UNEP, 1994) was grouped under four headings. These were: persuasion, consumer action, political action, and eco-management. Persuasion is used when an individual or a group of people tries to convince others that a certain action is correct. Consumer action relies on the power of, money. It involves buying something that agrees with one's environmental values or not buying something that represents an action or idea one disagrees with. Consumer action is actually a specialized form of persuasion. Political action refers to bringing pressure on political or governmental agencies and/or individuals in order to persuade them to take positive environmental action. Eco-management is a physical action taken with respect to the environment. Hopefully, it results in either

maintaining or improving environmental quality. These groups were also used to categorize action-based activities.

Another category that was used to analyze action-based activities in the studied curricula was individual activities versus collaborative activities. Although this is not a category or a group that takes place in the UNEPMS, it can be helpful to organize and analyze action-based activities. Collaborative skills are encouraged and taught explicitly in the IBPYP curriculum and explained as “working cooperatively in a group; being courteous to others; sharing materials; taking turns” (IB, 2007, p.22). Collaboration with others is a skill in the MEB curriculum explained as contribution, cooperation, communion and group work (TTKB, 2005). Collaborative and individual activities, thus, is one of the categories that have been used for analysis of action-based activities in selected curricula.

Table 8
Action-based activities in UNEPMS curriculum

Curriculum	Action-based environmental activities	Category
United Nations Environmental Education Curriculum for the Middle School (UNEPMS)	Convincing a friend to recycle aluminium or convincing parents to purchase foods which come in environmentally-appropriate packaging	Persuasion/real life/individual
	Making an action plan for solid waste management at their school. Students work in groups to make the plan and apply it. They look into alternative disposal methods if necessary	Action plan/real life/eco-management/collaborative
	Students learn about recycling process, recycle signs, and visit a recycling centre. At the end of the learning process, students are asked to do shopping at the grocery store and share their items at the school next day. Students are expected to buy only food which are packaged in recyclable containers	Real life/ in the field/eco-management/individual
	Students choose to write a letter to either a legislator supporting the passage of an environmentally-appropriate law, or to a candidate with a good environmental record in order to show their support and ask for help for a local environmental issue	Real-life/political action/individual
	Either in groups or individually students compost organic matter such as leaves and vegetable wastes at the school	Real life/eco-management/in nature/collaborative

Action-based activities in the UNEPMS are aimed at students to gain real life skills which they can use when they face real life problems in ever day life. These real life action related activities teach real life skills by teaching collaboration which can be a necessary skill during group work. Visiting a recycle centre, composting organic

matter and making an action plan for solid waste management can be given as examples of real life activities in UNEPMS.

Activities that teach action in the UNEPMS teach certain skills and approaches where students want or need to act individually. It can be seen that the UNEPMS encourages students to communicate with politicians in order to draw their attention to local environmental issues. Communicating and persuading politicians to take positive environmental action empowers individuals and allows the practicing of democratic skills which are real life skills. Action related activities in the UNEPMS intend students to learn behaviours, attitudes, and skills to act respectfully towards the environment. By eco-management activities students learn about their harmful impacts on the environment and what ways they can reverse the negative impact and preserve it. Eco-management activities teach students to manage and use resources in a more effective way so they can preserve the environment in which they live. Recycling activities teach students to what extent garbage can harm the environment reversible and irreversible ways. By learning how to recycle, reuse, and reduce resources, students learn responsible action and participation.

It can be seen that action related activities in the UNEPMS were practiced in nature and in the field where students can experience the objective of the learning in a natural environment. By doing action plans, students learn about the process of making a plan and achieving that plan step by step. Students also learn time-management and resource allocation by doing and applying an action plan which acts towards the resolution of environmental issues.

Table 9

Action-based activities in OEC curriculum

Curriculum	Action-based environmental activities	Category
Ontario Environmental Curriculum (OEC)	Students assess the ways in which liquids and solids in the home are used, stored, and disposed of in terms of the effect on personal safety and the health of the environment by making a list of the ways in their own home. According to the list they have made, students suggest responsible actions to replace inappropriate practices	Real life/eco-management/ individual
	Students suggest ways to reduce personal energy consumption in their own family and explain why it is important for people to make these choices	Real life/eco-management/ Consumer/ individual
	Students start a campaign to protect animals and their rights in the local environment; visit zoos, wildlife parks, and pet owners	Eco-management /real life/in nature/ collaboration
	Evaluate the effects of various technologies on energy consumption (e.g. improving our home's insulation allows us to conserve heat and reduce energy consumption; aerodynamic design can improve the energy efficiency of cars and buses; household appliances designed to make our lives easier use large amounts of energy; some cars and recreational vehicles use energy less efficiently than others), and propose ways in which individuals can improve energy conservation	Action plan/real life/eco- management/ individual
	Compose an accompaniment for a story, poem, or drama presentation to address an environmental issue such as water conservation, recycling, or planting trees, then share their piece with the others in the classroom and their family	Hands on/persuasion/ Eco-management /individual

In the OEC curriculum, action-based activities that teach eco-management were

emphasized. Students learn about the resources, matters, and materials from everyday life. They learn about the ways resources and materials were used, stored, and disposed of at home and at school and in what ways the harmful effects of misuse can be reduced. In order to manage resources more ecologically friendly; students learn the skills that would empower them to become a more environmentally friendly consumer. They learn how to allocate their power of consuming and money in such ways to preserve the environment.

Real life activities in the OEC aim to teach real life skills which would empower students to find solutions to everyday environmental issues. They learn about the environmental problems and/or knowledge in their own habitat so they will be exposed to real life conditions. Students learn how to convince others to practice ecologically and environmentally friendly action by learning and applying persuasion techniques. Students make action plans in order to find a solution to environmental problem in everyday life and learn to apply these personal action plans effectively.

It can be seen that individual action is taught explicitly within the action related activities in the OEC. Students learn about their own responsibility regarding the environment and the importance of individual action and participation.

Table 10

Action-based activities in MEB curriculum

Curriculum	Action-based environmental activities	Category
The Turkish Ministry of National Education Curriculum (MEB)	Developing simple procedures to clean up the environment such as starting a garbage collection campaign	Hands on/Real life/eco-management/individual
	Students choose an area in the school playground to create a park. They prepare the soil and plant flowers, trees, and vegetables considering the geographical conditions. Students take care of the park	Real life/in nature/eco-management/collaboration
	Students will be asked to create a tree planting activity. Students will plan all details of this event by cooperating with each other, parents, and NGOs then apply their plan by actually planting the trees	Action plan/real life/eco-management/collaboration

Environmental activities related with action in the MEB curriculum put more focus on real life and eco-management activities than the other categories of analysis.

Action-based activities aim to help students learn to act, preserve, and improve their immediate environment by planting trees and managing garbage in an environmentally friendly way. Students take action in real life situations which give them opportunities to see the results of their action and take personal responsibility.

By doing real life activities, students apply real life skills to engage and find solutions to everyday issues that they are experiencing in their school and at home.

The action-based activities that take place in the nature help students to connect with nature and living things.

Eco-management activities in the MEB give students opportunities to act respectfully toward the environment. Although they do not learn about their harmful impact on the environment they look into ways to improve and preserve their world.

It can be seen that action related environmental activities in the MEB teaches collaborative skills to the students. By working, planning, and making decisions with others students, they learn how to collaborate and cooperate with others in taking action towards saving and conserving the environment. Individual action was supported and taught in the MEB curriculum. By developing a procedure to clean their environment, students learn about individual responsibilities and conditions.

Students learn about how to make an effective action plan which requires certain steps, time-management, and resource allocation when developing an action plan to organize a tree planting event. They also learn how to collaborate with adults including non-governmental organizations (NGO) and parents so they can understand that their actions can be supported, empowered, and enriched with the contributions from adults.

Table 11

Action-based activities in the BNC curriculum

Curriculum	Action-based environmental activities	Category
British National Curriculum (BNC)	Students go to a local lake to learn about the natural habitat of insects in the lake, collect some examples, search on what they need to survive, and the students' own impact on this habitat. In addition, they learn the ways students should act in order to preserve this local lake and the insects living in it.	Hands on/In nature/ eco-management /individual- collaboration
	After students determine a local environment issue, students write to a newspaper about the issue, how it can be resolved, and how humans should act to preserve the environment	Real life/political action/collaboration
	Students observe traffic pollution in their own neighbourhood. According to the level of the pollution, students come up with a plan to reduce the pollution in their area, share it with the residents, and apply it using collaboration with the residents	Real life/eco- management/ Collaboration
	Students make personal plans about looking after their school environment, apply their plan, keep journals about the application of their plan, and sharing their journal with their teachers	Action plan/real life Individual
	Students find and apply a way to look after their immediate environment that has been harmed	In field/eco- management/real life Individual
	Students allocate resources differently at school to show that how these decisions affect individuals, communities, and the sustainability of the environment. They make a plan in groups and apply it	Hands on/real life/eco- management/ collaboration

Table 11 (Continued)

Action-based activities in the BNC curriculum

Curriculum	Action-based environmental activities	Category
British National Curriculum (BNC)	Students take responsibility to make simple choices that improve the well-being of the environment in their school. They share their actions with class mates and encourage each other to make environmental choices	Real life/persuasion/action plan/individual
	Students face new challenges about their immediate environmental issues (for example recycling, reusing, reducing, or air pollution) that will be assigned by the teacher. They face them positively by collecting information, looking for help, making responsible choices, and taking action	Real life/eco-management/individual
	Students take responsibility for looking after animals properly (class pet, animals in the neighbourhood or at home)	Real life/eco-management/Individual
	Students taking part in a local conservation project in order to manage the environments sustainably	Real life/eco-management/Collaboration
	Students plan their travel journey to school and home in a healthy and sustainable way and apply it	Real life/action plan/individual
	Students find out about the different kinds of plants and animals in the local environment and care for the animals, plants, and their environment.	Real life/in nature/eco-management/Individual
	In order to investigate the effect of light, air, water, and temperature on plant growth, students create individual gardens in a designated area on the school grounds. They examine the different kinds and levels of light, air, water, and temperature to find and give the best care	Hands on/real life/in nature/individual

Table 11 (Continued)

Action-based activities in the BNC curriculum

Curriculum	Action-based environmental activities	Category
British National Curriculum (BNC)	Students take a survey in their neighbourhood to find out a common issue regarding living things and the environment. They decide on ways of protection	Real life/in field/eco-management/ individual
	Students start a conservation project for the school environment.	Real life/in nature/eco-management
	Students find an environmental issue, caused by a change in an environment for example, increasing traffic congestion, hedgerow loss, drought and create attempts to manage the environment [for example, by improving public transport, creating a new nature reserve, or reducing water use]	Real life/in field/eco-management
	Students go to country side to learn about the natural habitat of animals in that place, search on what they need to survive, and the students' own impact on this habitat. In addition, they learn the ways students should act in order to preserve this local habitat and its residents	Hands on/In nature/ eco-management /individual-collaboration

The BNC curriculum places the biggest emphasis on real life and hands on activities that take place in nature and in the field. Real life skills that need to deal with an everyday issue were taught by finding out and attempting to resolve real problems regarding a habitat, their neighbourhood, school, and/or home. It can be seen that when students need to learn about a living thing, these activities take place in nature where students were exposed to the real life conditions of the living things. By examining the natural environment of living things, students make a connection with nature that helps them to understand that they are a part of the environment.

Eco-management activities give students the chance to learn and apply certain skills in order to be a wiser consumer who acts respectfully toward the environment. By recycling or reusing materials students understand they can reduce the harmful behaviour and attitudes. By taking care of animals and plants in their environment, they learn to be ecologically friendly. Students begin projects such as organizing a recycling activity or the collection of garbage to conserve their environment.

It can be seen that political action where students write about an environmental issue to a local newspaper to make it public and to draw others' attention to it takes place in the BNC action-based activities. Students try to convince others to act towards the conservation of the environment and to reduce their harmful affect on it. Although persuasion and political action was not taught explicitly with action-based activities in the BNC, action-based activities teaches a wide variety of action skills, attitudes, and behaviours to the students that include all categories of analysis.

Both individual and collaborative skills were emphasized in these action-based activities. Collaborative skills were taught through making observations, conducting surveys, and applying action plans in groups. Individual activities were taught and encouraged by taking personal responsibility of their own impact on the environment and taking individual actions to reduce harmful effects on the environment and then to act to preserve the environment.

Students learn to make action plans using the activities they use to plan their journey to school and by making personal plans looking after the school environment.

Students understand and apply the different stages of realizing an action plan which

gives them the opportunity to organize the action.

Table 12
Action-based activities in the IBPYP curriculum

Curriculum	Action-based activity	Category
IBPYP	Students examine and apply ways in which the local community could be improved in relation to the conservation of energy identifying or generating a question or problem	Real life/ in field/consumer/ persuasion

The IBPYP is an international curriculum that gives the minimum standards and expectations to the IBPYP schools that they are expected to meet. It also gives flexibility to the schools in creating their own curriculum as long as the level of overall expectations regarding student achievement expressed in the schools' documents at least matches that expressed in the IBPYP scope and sequence documents (IB, 2007). Therefore, IBPYP does not suggest activities and give schools the occasions to create their own activities aligned with their own curriculum.

However, IBPYP does give certain guidelines in the designing of activities. In this research these guidelines were examined to analyze the activity suggestions in the IBPYP curriculum. An example to an action related environmental activity from a private IBPYP school can be making posters to put around the school to help make others aware of how to save water and electricity. Students can choose to make their posters about water, electricity, reducing, reusing, or recycling while students are inquiring and learning about how their personal choices as consumers today affect the environment now and in the future.

It can be seen that the action related activity suggested by the IBPYP is a general

idea that suggests students act in real life situations in order for them to learn and internalize real life skills. Students were given to opportunity to examine their immediate environment to find out about the environmental issues. Learning real life skills help students to understand real life problems and understand in what ways they can solve the problems. Although problem solving skills are taught and encouraged by critical thinking activities, applying these skills towards solving an environmental issue helps students learn how to take action.

Eco-management activities encourage students to use their money and will to make ecologically and environmentally friendly decisions and actions. Students are taught how to convince others to act environmentally respectful and less harmful. By convincing others, students understand that persuasion is one of the ways to find solutions to environmental issues.

Approach to assessment in each curriculum

The studied curricula do not give extensive and sufficient information on environmental assessment strategies. In order to give information about environmental assessment in the studied curricula the mutual point of all curricula was examined. The information on assessment in the studied curricula was grouped as formative assessment and summative assessment for analysis and comparison.

Formative assessment provides information that is used in order to plan the next stage in learning. It is interwoven with learning, and helps teachers and students to find out what the students already know and can do (IB, 2007). Formative assessment and teaching are directly linked and function purposefully together.

Formative assessment aims to promote learning by giving regular and frequent feedback. This helps learners to improve knowledge and understanding, to foster enthusiasm for learning, to engage in thoughtful reflection, to develop the capacity for self-assessment, and to recognize the criteria for success. There is evidence that increased use of formative assessment particularly helps those students who are low achievers to make significant improvements in their understanding (IB, 2007).

Summative assessment aims to give teachers and students a clear insight into students' understanding. Summative assessment is the culmination of the teaching and learning process, and gives the students' opportunities to demonstrate what has been learned (IB, 2007). It is expected that summative assessment takes place at the end of the teaching process and gives teachers, students, and parents information about a students' understanding. The results of the summative assessment usually feed into the school grade reporting.

It can be concluded that formative and summative assessments have different roles in students' learning, while formative assessments give students regular and ongoing feedback throughout the teaching process, summative assessment give a final feedback that inform students' about their final performance.

Assessment in the UNEPMS requires teachers to design and carry out appropriate assessments of student learning at each of the four environmental education goal levels i.e. ecological foundation, conceptual awareness, issue investigation and evaluation, environmental action skill. UNEPMS uses a general teaching model for environmental education (UNEP, 1994). In this model, pretesting (formative

assessment) has a great value when an instructor is beginning a new unit or commencing to work with a group of unfamiliar students. In UNEPMS, pretesting must be consistent with the objectives. In general the teaching model (UNEP, 1994) post-testing (summative assessment) is a term that describes the evaluation that will take place upon the completion of the teaching process. In UNEPMS, it is claimed that environmental objectives will be evaluated en route, as students progress through the learning sequence (formative assessment). In UNEPMS main goal of the assessment is the students' evaluation on the objectives as stated, in a manner consistent with instruction. The goal is not only measuring the students success but post-testing is also a remarkably good indicator of the suitability or success of the instruction itself, particularly if the objectives and instruction are sound.

According to MEB, effective assessment should be embedded in the curriculum and teaching. Assessment should lead students to make a connection between their knowledge and real-life. The analysis of the assessment in the MEB curriculum indicates that formative assessments are applied during the process of teaching and learning by self-reflection, peer-assessments, and projects. The type of summative assessment change in the early years and in the grades four and five. Although the written final tests are not allowed in the grades Kindergarten through third in the MEB, the number of required written summative tests go up to minimum two for each subject area for each semester for grades four and five (TTKB, 2005). It can be concluded that the number of formative assessments decrease when the students get older in the MEB curriculum. It is evident that although the goal of assessment should be giving ongoing constructive feedback to the students with the aim of improvement, MEB supports written tests that take place at the end and give students

a final judgment on their knowledge level. It implies that final assessment aim to give feedback on knowledge level not authentic learning that would lead students to make connections with real life which would develop higher order thinking skills. It can thus be stated that assessment in the MEB does not encourage authentic assessment which would enrich action-based learning.

The OEC promotes developing and implementing transparent assessment mechanisms for monitoring student achievement in environmental education. The OEC claims that instruction should be supported by formative and summative assessments (The Ontario Curriculum, 2010). The fundamental principles of the formative assessment should be supporting all students and should be carefully planned to relate to the curriculum expectations and learning goals which proposes courses of practical action to deal with problems relating to science, technology, society, and the environment. This process should be ongoing, varied in nature, and administered over a period of time to provide multiple opportunities for students to demonstrate the full range of their learning. OEC appears to support summative assessment that takes place at the end of teaching process to inform school community about student success and further revision of instruction.

The prime objective of assessment in the IBPYP is to provide feedback on the learning process which also can be defined as formative assessment. The assessment strategies and tools proposed by the IBPYP—rubrics, exemplars, anecdotal records, checklists, continuums, portfolios of work—are designed to accommodate a variety of intelligences and ways of knowing (IB, 2007). It implies that where possible, IBPYP provides an effective means of recording students' responses and

performances in real life situations that present real problems to solve. These authentic assessment strategies suggested by IBPYP may be used in conjunction with other forms of assessment in order to give feedback and improve student learning.

Assessment in the BNC at Key stage one and two is made up of tasks and tests.

These are designed to be administered informally as part of normal classroom activity. Instead of authentic assessment strategies and tools, the BNC support tasks and final assessment such as tests that designed to help inform the teacher regarding student achievement for each child at the end of Key stage one and two. These tests and tasks are based on knowledge of how a child has performed over time and across a range of contexts; and in the process of weighing, scientific enquiry take the highest rank while life processes and living things weighing lower which has the biggest number of environmental goals in the science curriculum. It can be concluded that the BNC emphasizes assessing student knowledge with the summative assessment and does not support ongoing student learning and understanding during the teaching and learning process.

Results related to analysis of the interviews

The purpose of this study was to make recommendations for primary schools from Kindergarten to grade five in Turkey towards an environmental curriculum that enables students to acquire certain knowledge, skills, and attitudes that will lead students to initiate action on finding and implementing solutions to environmental problems. To accomplish the purpose of the study three educators from a leading state university, two teachers, and one administrator from a private elementary school

and three different officials from three different leading non-governmental environmental organizations (NGO) were interviewed.

The main goal of these interviews was to determine what the interviewees see relevant and important related with the environmental education in the Turkey Ministry of Education (MEB) curriculum. The second goal of the interviews was to obtain further information about the possible role of NGO's in environmental education and the educators' and NGO officials' views on what is needed to improve environmental education within Turkey. Their opinions and suggestions, based on the educators' experience of research and teaching practices and NGO officials' experiences with the teachers, students, administration, and parents are used in the preparation of recommendations and sample lesson plans to improve environmental education in the MEB curriculum.

Analysis of the interviews with educators

The interviewees were three educators from a leading state university in Ankara, Turkey who are experts in early education and elementary education. They have worked with the Ministry of Education to prepare programmes and text books for students and guide books for teachers. In addition, two teachers and one director from a private elementary school in Ankara, Turkey who were experienced in the MEB curriculum were interviewed.

The interview questions for all of the above educators emerged from the main goals of this research which can be seen in the Appendix A. The interviews were aimed to collect the thoughts of experts in elementary education in Turkey to determine the

age to start the environmental education, right approaches in education to address for an action-based instruction, and how MEB curriculum can be improved for an action-based environmental education. Face to face semi-structured interviews were administered and recorded by using tape recorders. After the interviews, transcription from voice record to written form was performed. The interviews were read several times to become familiar and understand the data considering the interview questions which were directly linked to purpose of this study. Second step was to determination of the key words and phrases that directly linked to interview questions which aim to determine the age to start the environmental education, right approaches in education to address for an action-based instruction, and how the MEB curriculum can be improved for an action-based environmental education. The third step was to determination the categories that arose from the questions to organize the responds of interviewees under. The key words, phrases, and sentences from the responds of interviewees to the interview questions were placed under each category. In order to classify responses in more detail, additional codes of unit were determined and aligned with the research questions. These codes were age, objective, and activity. There is another code of unit that is teacher training does not come from the research questions however, teacher training brought up by the interviewees as an area during the interviews. Therefore, it is one of the codes of analysis. Categorized and classified responses from interviewees are explained qualitatively.

Initials in the brackets are the initials of the interviewees to present which educator mentioned which thought.

Table 13:

Thoughts of educators on environmental education in the MEB curriculum

CATEGORIES	RESPONSES FROM THE INTERVIEWEES	CODE
Interviewees' thoughts about environmental education in Turkish Ministry curriculum?	Environmental education should be a separate subject area (BA)	Objectives
	In current MEB curriculum environmental objectives are blended within the subject areas; there should be separate specific objectives for environmental education (BA)	Objectives
	Sustainable development is one of the most important concepts in environmental education does not exist in the MEB curriculum. Sustainable development should be taught at the schools (BA)	Objective
	Teachers should be trained about how to teach environmental education (TU)	Teacher training
	The goals should be taught in the nature, by camping, weekend activities (TU)	Action
	Numbers enough, not taught efficiently (KI)	Activity
	Low level of environmental goals (ZK, FB)	Objective
	More hands-on activities (TU, SE, ZK)	Activity

First category: Thoughts of educators on environmental education in the MEB curriculum

The first category in Table 13 includes responds of the interviewees to the questions related with how environmental education is taught in the Turkey Ministry of Education (MEB) curriculum. BA indicated that the environmental education is blended with some other subject areas in the MEB curriculum.

According to BA environmental education should be a separate subject area for an effective environmental education. BA and TU indicated that the goals for environmental education are theoretically sound and effective enough they are not supported by the right kind of activities, thus they are not internalized by the students. KI also emphasised the adequacy of the number of environmental goals although they are not taught effectively. She mentioned that the goals should be taught explicitly and in-

struction should be supported by effective teaching resources i.e. relevant books, trained teachers. ZK claimed that the environmental objectives in the MEB curriculum do not go beyond informing students and finding simple solutions to simple problems that occur in the student's environment i.e. switching off the tap to save water.

BA stressed the importance of the concept *sustainable development* and although it is a very important concept in the environmental education, she thinks that it is neglected in the MEB curriculum and should be taught explicitly in order to teach student the reasons and ways to sustain their current environment.

FB mentioned that the environmental objectives in the MEB curriculum covers the information-comprehension level of thinking skills in Bloom's taxonomy of learning domains (Bloom, 1956) which are the simplest levels in the taxonomy. Information and comprehension are the foundation level of learning however they do not create opportunities for problem solving skills unless they are supported and enriched by hands-on activities in relevant context. Therefore, goals and activities that aim to develop higher order thinking skills should be added to the MEB environmental goals.

TU and SE emphasised the importance of students' learning by doing and how limited number of hands-on activities in the MEB curriculum influence students' environmental behaviour. TU said that only a few visits to the schools would show visitors the lack of environment friendly behaviour in elementary schools in Turkey. SE

indicated that it is very important in order to develop habits, attitudes, behaviour and higher order thinking skills and students should have opportunities to do hands-on activities simultaneously while gaining knowledge and awareness. ZK also emphasised the importance of hands-on activities that assist students in learning to solve the issues around them as well as helping them to determine the issues.

Table 14:

Thoughts of educators on the starting age to environmental education

CATEGORIES	RESPONSES FROM THE INTERVIEWEES	CODE
When should environmental education start at the schools?	Environmental education should start in early childhood because students start to learn about the how the world works as soon as they start to school (TU)	Age
	Four and five years old in order to create attitude and behaviour (BA)	Age
	Environmental education should start as soon as a child start to learn therefore it starts in the family; it should start in pre-school (ZK)	Age

Second category: Thoughts of educators on the starting age to environmental education

The second category in Table 14 includes responds of the interviewees to the questions related with when to start to teaching environmental education. All educators who were interviewed agreed that environmental education should start with early childhood education. ZK and TU emphasised that as soon as a child start to realise his/her environment (room, home, others) the education should start within the family. The formal education should start as soon as children began their education in pre-school. BA also advocates that environmental education at the schools should

start at ages four and five because these are the ages that children begin to develop attitudes and behaviour.

Table 15:

Thoughts of educators on how to improve a curriculum towards an action-based curriculum

CATEGORIES	RESPONSES FROM THE INTERVIEWEES	CODE
In what ways environmental education should be delivered to the students for action-based learning?	Environmental education should be delivered by hands on activities, because students learn by doing (TU, ZK, BA)	Action
	Teachers should target attitude, behaviour and development by using higher order thinking skills activities (SE)	Activity
	Students should learn about the environment by inquiring, asking questions and doing investigations (TU)	Activity
	Teachers should encourage students to ask “why” and “how” questions which triggers higher order thinking skills and environmental consciousness (SE)	Activity
	Teaching abstract thinking skills starting from early ages by teaching critical thinking skills (KI)	Age
	Students should be given opportunities to explore and apply their ideas in order to see the results of their behaviour and choices (ZK)	Action
	Responsibility should be taught explicitly for students to understand in what ways we contribute the environmental issues and in what ways we can preserve the environment (TU)	Action
	Students positive attitude towards the environment should be rewarded to teach positive environmental behaviour (TU)	Action
	Students should be taught about the positive behaviours and choices by modelling by the teachers (ZK, FB)	Action
	Teacher training (SE)	Teacher training
	The schools should cooperate with NGOs (TU)	Action
Democracy education	Action	

Third category: Thoughts of educators on how to improve a curriculum towards an action-based curriculum

The third category in Table 15 includes responds of the interviewees to the questions related with the ways of delivering environmental education for action-based learning. All of the educators were consistent about how the action-based environmental education should be at schools. According to BA and SE, higher order thinking skills, i.e. abstract thinking skills, critical thinking skills start with early childhood if given

the opportunities to ask “why” and “how” questions. Students should be knowledgeable about the environment, however using transferring knowledge strategy alone causes students to memorise information and does not enable them to develop higher order thinking skills. Thus, raising awareness and transferring knowledge activities should be supported by investigations, observations, presentations of findings and criticising existing structures and information. KI also emphasized the importance of teaching abstract thinking skills in the early ages in order to develop critical thinking skills.

According to TU, activities that let students develop attitudes, behaviour, and habits which lead to protection of the environment should be taught at schools. These kinds of activities should take place in the nature or natural place of the issues, i.e. school, classroom, playground, streets and be supported at home because built in attitudes, behaviours and habits become permanent for the rest of the lives of the students. BA indicated that, nature camping, informative gatherings in the school and/or in the nature, boy and girl scouts and TV programmes are some of the approaches that would teach students relevant attitudes and skills that would lead them to participate and contribute to the solutions of environmental issues. SE mentioned that activities should aim to teach different developmental goals such as psychomotor, emotional, and cognitive development in order to have permanent learning and real understanding that would lead students to participation and action.

According to BA, students learn best by doing things. Therefore, many opportunities to apply their knowledge in nature, in school, and at home should be given to stu-

dents. Students should do investigations and research on their own environment, ask questions and find the reasons for issues. If they find the reasons of the environmental issues it would be easier for them to find solutions to these issues. BA also mentioned that in order to find appropriate solutions, students should have some certain skills to be able to learn how to deal with a problem. They also should apply their solutions and see their results. They will have a deeper understanding about the environment when they see the results of their own solutions such as recycling, decreasing consumption, and effective usage of natural resources. BA also added that geographical characteristics, historical, and cultural dimensions should be considered in students' education with the aim of some activities in the environmental education differ from region to region or city to city and then considering these differences. TU and ZK also emphasized the importance of hands-on activities which give students the opportunities to learn by doing.

UO emphasized the importance of democracy education to enrich environmental education. He stated that democracy education in environmental education should be enabled in order to make students envisioning alternative ways of development and to be able to participate in action.

SE emphasised the importance of environmental consciousness. He mentioned that children who have the environmental consciousness can display environmentally conserving behaviour. In order to develop environmental consciousness he indicated the importance of learning about the environment which should be taught by activities that will be applied in the nature. Only awareness and knowledge transfer would

develop environmental consciousness, attitude and behaviour which are essential for active participation. ZK and FB also emphasized the importance of teacher training and teachers' attitudes on student learning.

According to TU and SE students should see positive outcomes of their actions. Teachers should reinforce positive behaviour and point out the positive outcomes of the students' actions. TU mentioned that schools should represent positive behaviours that lead to environmentally friendly behaviour in order to teach the behaviour to the students. The main goal of environmental education should be to explore ways to preserve the environment and the ways that do not preserve environmental issues. According to ZK, students should have opportunities to apply their own ideas so that they can see the consequences of their behaviours and choices and learn from the experiences.

TU also suggested that responsibility is one of the most important attitudes in environmental education for students so that they understand in what ways they contribute to the environmental issues. When students see their own impact on the environment, they begin to explore ways to reduce their impact and for ways to preserve the environment.

SE mentioned the importance of teacher training in the MEB schools that should take place regarding environmental education and how it should be done. He said that there should be professional development opportunities for teachers to learn about the environment and relevant skills to pass on students about what they have

learned in a way that would lead students to participate and contribute to environmental solutions.

TU mentioned that MEB schools and NGOs should cooperate for an effective environmental education. She said that NGOs support is very important and critical for an effective environmental education. Schools teach students about ecological agriculture and encourage students to support NGO's that work for ecological agriculture in order to understand some of the ways that ensures the production systems that sustain the health of soils, people and the environment.

It can be seen in the Table 15 that educators suggestions and thoughts about improving the MEB curriculum towards an action based curriculum categorized around teaching to take action, increasing the number of action-based and critical thinking activities, beginning the environmental education as soon as students start to school, role of NGOs and training teachers about the best practices to teach environmental objectives.

Thus, in summary, the above educators agreed that environmental education should start at the pre-school level and an effective action-based environmental curriculum should be based on the development of certain skills, attitudes, habits, and behaviour that would lead students to determine environmental issues and empower them to find solutions to the issues by hands-on activities, activities that develop higher order thinking skills, promote curiosity, promote investigation, and exploration of the students' environment.

Analysis of the interviews with non-governmental organisations

Three non- governmental organizations (NGO) officials from three different NGOs were interviewed in order to find out in what ways they work for the environment in Turkey, whether they work with young children, and in what ways they empower and motivate people to action. NGO officials' thoughts and observations about environmental education in Turkey and in what ways environmental education can be improved were collected by interviewing them. Their thoughts, observations, and suggestions based on their experiences with the participants, were used in the recommendations to improve environmental education in the MEB curriculum and in sample lesson plans.

Tables 16-18 present the analysis of the results of interviews with the NGO organizations in Turkey. The interview questions for NGO can be seen in Appendix B.

The interview questions for the NGO officials aim to find out in what ways they address environmental issues, if they include early childhood in their activities, and in what ways and how NGOs and the schools can cooperate to empower environmental education. After the transcription of the interviews from voice records to written form, certain categories determined according this research. The answers also categorized and organized under these certain categories such as the approaches that would make children active participants of environmental actions. In order to classify responses in more detail, another code of unit was determined and aligned with the research questions. These categories were age, objective, activity, and assessments were shown in the third column of each table. As one of the codes of

unit, teacher training is not included in the research questions however, it has been mentioned by the interviewees. Categorized and classified responses from interviewees are explained qualitatively. The categories and the responses are shown in Table 16-18. Initials in the brackets are the initials of the interviewees.

Table 16:

Activities and tasks that NGOs organize with children

CATEGORIES	RESPONSES FROM THE INTERVIEWEES	CODE
What kind of activities and tasks does your organization do with the children?	Environmental activities that influence five senses i.e. investigation of the certain habitat in its natural setting with an expert (EG)	Action
	Presentations at the schools that aim to inform students about the environment and environmental issues which enriched with hands-on activities (EG, NA)	Action
	Eco-school project: Eco-school project aims to train and empower elementary students on environment, environment management and sustainable development e.g. learning how to sort waste, organizing campaigns throughout the school and the community on specific environmental issues, investigating the schools to determine how much environmental friendly they are and how they can be more environmental friendly (EG)	Action
	Green schools project- Train and activate elementary school students to transform their environment into more environmental friendly place (UO)	Action

The first category: Activities and tasks that NGOs organize with children

This first category aimed to determine what kind of activities that non-governmental organizations do with the elementary age students. It can be seen that all of the activities that the NGOs conducted with the participants encouraged taking action.

EG gave information about an effective environmental programme called “Eco-schools project” that they offer to the schools in Turkey. Eco-school project is a non-profit, optional project that TURCEV provides to the schools. This project aims to

inform and empower elementary students to participate in environmental management and sustainable development activities, seminars, and projects. Students learn about the environment and also teach their families and friends about the environment. Students participate and organize environmental activities in their own school and in their local community such as campaigns to inform people about the environmental issues, meetings to find solutions to the local issues in the school or at home. EG mentioned that the elementary school students are the best representatives of the environment and they are the best influence on their parents. Therefore, they are the best representatives of the environmental action and they should be involved in environmental education as soon as they start their formal education.

UO also mentioned that elementary students are the pure voice that people and especially parents listen to. He said that any campaign involving elementary students would have a spill over effect to their parents. UO gave information about the Green school project that Greenpeace provides to schools. In this project, the organization trains students to transform their environment. “The environment” is their school to start with. Students investigate their school in order to find out how energy is produced, if there are any toxics in the learning materials they use and in the cleaning materials that have been used in the school. According to the results students make suggestions to the administration of the school. When students start to transform their school they learn so much about the harm human make to the environment and they start to train their parents, friends and community. Therefore it is very important and critical to work with elementary students.

Table 17:

Thoughts of NGO officials on action-based environmental behaviour

CATEGORIES	RESPONSES FROM THE INTERVIEWS	CODE
What approaches would make children active participants of environmental actions?	<p>All age groups should be involved in environmental action (EG, UO, NA)</p> <p>Critical thinking skills should be taught to the students to develop higher order thinking skills (UO)</p> <p>More hands on activities (UO)</p> <p>It is crucial to teach students to ask “why” and “how” questions in order to them critical thinking and problem solving skills which they will need to solve the issues around them (UO)</p> <p>Students should learn to make observations to examine their environment (EG)</p> <p>It is important students to learn presentations skills to use when they will need to inform the school community (NA)</p> <p>Students should be given opportunities to investigate their environment (school, home, playground) to find out their footprints on earth (UO)</p> <p>Students should be given opportunities to build new structures to solve environmental issues in their own environment (school, home, playground) (UO)</p> <p>Students should see the consequences of environmental issues in order to understand their responsibility (UO)</p> <p>Students should see positive outcomes of environmental friendly behaviour to be motivated (EG, NA)</p> <p>Teaching sustainable development (NA)</p>	<p>Age</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p> <p>Activity</p>

The second category: Thoughts of NGO officials on action-based environmental behaviour

The second category in Table 17 shows the thoughts of interviewees regarding the approaches that would help children become active participants of environmental actions. According to the analysis of the thoughts of the NGO officials, they all think students’ environmental behaviour can be taught and encouraged by activities with all age groups.

EG, UO, and NA emphasized the importance of working with the all age groups.

They mentioned that starting from Pre-school, all age groups should be engaged in

the environment and environmental education. UO said, for elementary students their environment is their school, therefore students learn to observe, criticise, and transform their environment. Investigation and observational skills are critical for this age group. When students realize their effect on the environment then they look into ways to find environmental friendly solutions to the issues. EG mentioned the critical thinking skills play a key role for children participation in the environmental activities. NA emphasized the importance of being knowledgeable about natural resources and how human should use them effectively.

EG and UO indicated the importance of realization and awareness of environmental issues. UO said certain amount of awareness and knowledge plays a key role for children to act towards the solutions by saying “no” to certain decisions and structures and finding the right ways by research, investigate and inquire. Any knowledge should be enriched by hands-on activities that students experience in their environment. He also said that environmental education should give opportunities to people to see and realize the consequences of the kinds of lives and systems that society has. Once consequences are seen by the students they would realize that there is an emergent need to act for solutions. Therefore, according to UO environmental education should aim to realization of the need for change and empower students to take charge to deal with this change. Students should learn to question and criticize the systems in place.

EG mentioned certain skills and attitudes that elementary age students should acquire in their environmental education to act towards the solutions. Responsibility,

observation, and presentation skills can be given as examples to these attitude and skills. Responsibility plays a key role, according to EG, to help students realize what the results of their own actions and behaviour are and what kind of change is needed as well as how this change can be accomplished in order to protect and sustain a greener environment.

NA said students should learn about sustainable development and how they can be producers and consumers in sustainable ways. NA said that for a successful environmental education, teachers also should be trained as well as their students. WWF offers a training for teachers called “Karadeniz Eğitim Kutusu” which educates teachers about sustainable life styles and how these can be taught to the students starting from an early age.

EG, UO, and NA stressed the importance of cooperation between the schools and organizations for a green future. UO said these kinds of gatherings should aim to create questions in children’s minds that would lead them to search for further information which would make them realize the environmental issues in their local environment. He said non-governmental organizations should lead students to ask “Why is my school getting electricity from the grid?”, “Why my school is not producing its own energy?” “How can we reduce consumption when the whole economy system is fuelled by consumption itself?” and “How can I think about a new economy in which my parents’ job does not depend on destruction of the environment?” Thus, the above NGO officers agreed that environmental education should start at very early ages in the family and the schools. NGOs should be

responsible and work together to develop children who actively participate to the solutions of environmental issues. Critical thinking skills should be taught to the students by teaching students how to ask questions, make observations, investigate their environment (school, home, and playground), and realizing the consequences of environmental issues.

Table 18:

Thoughts of NGO officials on the ways to cooperate with schools

CATEGORIES	RESPONSES FROM THE INTERVIEWEES	CODE
In what ways NGOs can cooperate with schools to empower environmental education?	NGOs can organize exhibitions, panels ,meetings and activities at the schools to encourage environmentally friendly behaviour and activities (EG)	Activity
	Schools and NGOs cooperate to find solutions to local environmental problems and apply solutions (UO)	Action
	NGOs can cooperate with the schools to organize training for teachers in order to teach them about the ways to deliver environmental education effectively (NA)	Teacher training

The third category: Thoughts of NGO officials on the ways to cooperate with schools

In the third category, the NGO officials suggested that schools and NGOs cooperate to organize activities that encourage students to take action. NGO officials stated that they can provide opportunities for teacher training at the schools as another way of cooperation.

In order to empower environmental education in ways NGOs and schools can cooperate is the third category of responses from NGO officials. EG indicated that NGOs can organize exhibitions and panels where officials or experts can present to

the students. In addition, NGO's can have meetings with administrators to help them promote environmental education so that more activities at the schools can be organized and applied.

UO stated that schools and NGO officials can get together regularly in order to discuss local issues and solutions. Teachers, administrators, and NGO officials can cooperate, share ideas, and encourage each other towards the solutions to local environmental issues.

According to NA, teacher training has a significant importance on the delivery of environmental education. Teachers who are more knowledgeable and active would give a more effective environmental education to the students. NA suggested that NGOs can help schools to organize teacher trainings on environmental education.

CHAPTER 5: DISCUSSION

Introduction

Chapter five provides a discussion of the main findings from the research and where applicable, links to literature to the research outcomes. This chapter begins with an overview of the study followed by major findings and conclusions from the study. In the following section implications for practice, implications for further research and limitations of the study will be discussed.

Overview

The purpose of this study was to make recommendations for elementary schools from kindergarten to grade five in Turkey to include environmental topics in school curriculum that enable students to acquire certain knowledge, skills, and attitudes that will lead students to initiate action on finding and implementing solutions to environmental problems.

In order to answer the research questions of the study, five curricula, United Nations Environmental Education Curriculum for Middle Schools (UNEPMS), the environmental curriculum from Ontario, Canada (OEC) for grades one through five, British National Curriculum (BNC) for Key stage one and two, The Turkish Ministry of National Education (MEB)Curriculum for grade one through grade five and International Baccalaureate Primary Years Programme (IBPYP) for Pre-Kindergarten through grade five were analyzed.

Content analysis was used as the method to analyse environmental objectives, environmental content, environmental teaching and learning activities, and the assessment approach in the selected curricula. Content analysis was conducted in three stages: analysis of the number of environmental objectives, analysis of the frequency of environmental words, and analysis of the number and type of environmental activities within each curriculum

Interviews administered with the educators and non-governmental organization (NGO) officials from Turkey in order to collect their thoughts on environmental education in Turkey, in what ways it can be improved towards an action-based instruction and how NGOs and schools can cooperate to this end. For this purpose, three educators from a leading state university, and one administrator and two teachers from a private school in Ankara Turkey and three NGO officials from three different NGOs were interviewed. Semi-structured, face to face interviews were administered, recorded and transcribed.

Major findings and conclusions

After the results were analyzed from the content analysis and interviews with educators and NGO officials, this research make the following conclusions regarding environmental objectives, starting age to environmental education, frequency of environmental vocabulary and environmental activities in the studied curricula.

Environmental objectives

Five curricula were analyzed to determine the number of environmental objectives in them which indicate to what extend the curricula comprise and emphasize the

environmental education. Environmental objectives in the Turkish MEB curriculum were analyzed in detail under four categories: raising awareness objectives, critical thinking objectives, action-based objectives and research-based objectives.

Based on the curriculum analysis, it has been found that UNEPMS is an environmental curriculum that fully focuses on the environmental education with all of the objectives are environmental. OEC is an environmental curriculum where environmental objectives are integrated into subject areas. Compared to UNEPMS curriculum, all of the objectives do not aim to deliver environmental content in the OEC curriculum. Although IBPYP curriculum does not claim to have an environmental content it has been found that it included a small number of environmental objectives. It can be seen that the environmental objectives in the IBPYP take place in the science and social studies curriculum. The BNC included a small number of environmental objectives in the geography, science and personal, social and health education curricula. It has been found that BNC included the smallest number of environmental objectives in the studied curricula.

The content analysis of this study illustrated that the MEB curriculum included a small number of environmental objectives in the *life science*, social studies and science curricula. The educators and NGO officials interviewed for this study suggested that, in order to strengthen the environmental content in the MEB curriculum, the number of environmental objectives in the MEB curriculum need to be increased or environmental education should be delivered as a separate subject area like mathematics and language. These results supported previous research (Alp

et. al., 2006; Erdogan et. al., 2009) which points out the lack of environmental education in the MEB curriculum.

In order to obtain more detailed data from the MEB curriculum, environmental objectives were classified under four types of objectives: raising awareness, critical thinking, action-based, and research-based objectives. Raising awareness related objectives can be defined as the objectives that aim at transmission of knowledge and expect students to reach to a certain level of learning and understanding of the content. Environmental objectives that targeted students to develop higher order thinking skills such as analysis and evaluation were categorized under critical thinking objectives. Objectives categorized as action-based were the ones that intended to lead students to take action by teaching the content in the nature, in the field and by teaching real life skills. Research related objectives can be explained as the objectives that targeted to lead students to be inquirers and develop certain skills to conduct a research.

The analysis of the MEB curriculum revealed that raising awareness related objectives take the biggest place within the MEB environmental objectives. Although action-based objectives do not comprise the majority of the environmental objectives, there are a small number of action-based environmental objectives that can be found in the MEB curriculum. It can also be seen that a small number of research-based and critical thinking objectives take place in the MEB curriculum.

A detailed analysis of the subject areas where environmental objectives appear in the MEB curriculum will reveal further information and conclusions from this study.

Life science, social studies and science curricula

Life science curriculum in the MEB curriculum includes and blends the basic science and social studies objectives for grades one through three. Based on the detailed analysis of the *life science* curriculum, it can be stated that majority of the environmental objectives in the *life science* aim to raise awareness about the environment. A small amount of objectives that target to teach action take place in the *life science* curriculum. However, there are no action related objectives in the grade one while more action related objectives can be seen in the grade two than in grade three *life science* curricula. The findings shows that environmental objectives related with critical thinking do not take place in the grade one and grade two *life science* curricula. A small number of objectives that aim at teaching research skills can be seen in grades one to three while majority of them take place in the grade three *life science* curriculum.

The MEB science curriculum comprises of science and technology objectives for grades four and five. Detailed analysis of the environmental objectives in the MEB science curriculum presents that the majority of the environmental objectives aim to teach raising awareness about the environment. More objectives related with raising awareness can be found in grade four than grade five science curriculum. The study illustrates that objectives that target teaching action can be seen in the science curriculum with the majority of them taking place in the grade four science curriculum. It can also be seen that objectives related with research were valued in

the science curriculum, especially in the grade four. A very few numbers of critical thinking objectives can be found in the science curriculum.

Social studies in the MEB curriculum for grades four and five comprises of objectives aimed at developing history, culture, and scientific methods of social studies. Analysis of the environmental objectives in the MEB social studies curriculum shows that majority of the environmental objectives aim to teach and raise awareness for the environment. It can be seen that raising awareness related objectives are distributed evenly in the grade four and grade five social studies curriculum while there is one more objective in the grade five related with raising awareness. However, environmental objectives that intend teaching research skills and inquiry cannot be found in the MEB social studies curriculum. Some objectives related with taking action appeared to take place in the social studies curriculum. Compared to grade five social studies curriculum more action related objectives take place in the grade four social studies curriculum.

Interviews

According to the educators and NGO officials who were interviewed in this study expressed views which supported above results during face to face interviews. They emphasized the importance of learning abstract thinking skills in the elementary school in order to develop higher order thinking skills which are essential to learning to take action and participation to the environmental acts. The participants of the interviews of this study stated that students should be knowledgeable about the environment, however raising awareness alone causes students to memorise information and does not enable them to develop higher order thinking skills. Thus,

they have suggested that for an effective environmental education majority of the learning objectives should target teaching action, inquiry and higher order thinking skills.

Related research

Research on environmental educations also provides supporting evidence to the suggestions that have been done by the interviewees of this research. Jensen and Schnack (1997) indicated the importance of action competence and they suggest that without action competence students cannot become rich in experiences which have a particular relationship to action. In a recent research same researchers (Jensen & Snack, 2006) emphasizes the importance of critical thinking skills, self-reflection, democratic values and acquisition of knowledge of human impact on ecology and ecological problems. Similarly, Prince (2010) stated that children need to be actively involved, both at home and school beginning in early childhood centres, learning sustainable practices for an environmental education. Moreover, Short (2010) stressed the importance of teaching higher order thinking skills which aim to develop independent critical thinkers equipped with the knowledge, attitudes, and skills necessary for *recordable action* is the best way to create awareness.

Therefore based on the thoughts of interviewees of this research and related study that supports their views and the findings of this research, it can be concluded that increasing the number of objectives that intend to teach action, higher order thinking and research skills in the *life science*, science and social studies curricula would enrich and strength the environmental education in the MEB curriculum. It is imperative to add objectives related with action to grade one life science curriculum

because no action related objective appeared in grade one. Similarly, adding environmental objectives related with critical thinking to grade one and grade two *life science* curricula would enable students to acquire higher order thinking skills which is essential for learning to take action. It would benefit the social studies curriculum towards an action based instruction to add objectives into it related with action which teaches them about participation, components of action and being active.

Starting age to environmental education

Content analysis of the environmental objectives in the MEB revealed that the science curriculum for grades four and five included the highest number of environmental objectives. It has been determined that the lowest number of environmental objectives take place in the *life science* curriculum for grades one to three. A detailed analysis of the *life science* curriculum illustrated that although it seems like the environmental objectives in the grades one, two and three distributed evenly, slightly less number of environmental objectives appear in grades one and two *life science* curriculum compared to grade three. This result was interpreted as although environmental objectives exist in the *life science* curriculum which the highest number of environmental objectives take place in the grade four science curriculum which might indicate that environmental education was more emphasized in the older grades. Therefore it can be stated that environmental education is less emphasized in early grades in the MEB curriculum.

Interviews

The participants of the interviews of this study provided evidence that supported above results of content analysis. They have suggested that environmental education should start with early childhood education, especially at ages four and five because these are the ages where children begin to develop attitudes and behaviours. The interviewees indicated that environmental education should start at very early ages in the family as soon as children start to realize their environment.

Related research

The literature also supports the thoughts of interviewees on starting age to environmental education. Hart (1997) states that students who start to learn relevant skills in early ages would be empowered to be active citizens to take action toward the conservation and protection of the environment. Similarly, Leeming and Dwyer (1995) mentioned that it is crucial to determine the developing environmental attitudes and knowledge during this formative period, since children acquire knowledge and develop attitudes about environmental issues as early as kindergarten. These views also endorsed by Trudel (1995). He mentioned that children are likely to progress faster in early ages than older generations and are more sensitive toward nature and thus should play an active role in the protection of the environment. Prince (2010) also highlighted the need for education of the environment to be an integral part of the early years of education.

Based on the content and interview analyses and review of related literature it can be concluded that environmental education in Turkey should place more emphasis on early childhood environmental education. It is also important to note that more

environmental content in the life science curriculum can be enriched by adding more environmental objectives into it starting from grade one.

Frequency of environmental vocabulary

Frequency of environmental words in each curriculum was analyzed to determine the focus of the content within the environmental objectives of the selected curricula.

The analysis of the most frequent words conducted based on the key words determined to take place in the environmental literacy (Pleasant et. al., 2001). The analysis of the frequency of environmental vocabulary illustrated that the most frequent environmental vocabulary appear to be *environment* followed by *action* in the UNEPMS curriculum. It has been found that *environment* is also the most frequent word in the environmental objectives in the OEC curriculum. Compared to UNEPMS *action* is not one of the environmental words in the OEC, however a small number of *action* can be seen within the environmental objectives in the OEC curriculum. The second most frequent word in the OEC was *nature*. *Environmental understanding* and *issues* appeared to be the most frequent environmental words in the BNC. In the PYP curriculum it emerged from the analysis that *environment* and *nature* were the most frequent environmental vocabulary. Although *action* is not one of the top most frequent words within the environmental objectives in the BNC and IBPYP curriculum, *action* takes some place in both curricula.

Life science, social studies and science curricula

The analysis of the most frequent environmental vocabulary within the MEB curriculum shows that the most frequent environmental word is *environment* followed by *resources*. It appears that *action* takes place in the MEB curriculum.

However, it can also be stated that *action* is not one of the most frequent words in it. Detailed analysis of the frequency of words in the MEB curriculum shows that *action* cannot be found in the *life science* and social studies curricula while it can be seen in the science curriculum. *Resources* is the second most frequent word in the *life science* for grades one to three while the second most frequent word in the social studies and science curriculum appear to be *nature* after *environment*. Although *action* do not take place in the life science curriculum *active* has been found to take place in it. *Active* implies the attitude towards the action however does not indicate the behaviour of taking action. Therefore it can be interpreted as the attitude of action take some place in the *life science* curriculum. *Sustainable development* does not appear in the *life science*, social studies and science curricula in the MEB curriculum. *Renewable* has been mentioned once in the science curriculum.

Interviews

Thoughts of the educators whom were interviewed in this study about the environmental vocabulary in the MEB curriculum seem to support the results of the curriculum analysis. They stressed the importance of the concept of *sustainable development* in the environmental education during face to face interviews. They have also mentioned that although *sustainable development* is a very important concept it was neglected in the MEB curriculum. NGO officials interviewed also claimed the same suggestion and stated that *sustainable development* should be taught explicitly in the MEB curriculum because it is important for local and global communities for the long term while still meeting the needs of our present generation therefore it needs to be taught to the students.

Related research

Thoughts and suggestions of the interviewees related with teaching sustainable development explicitly starting from early childhood supported in the related literature. The term sustainable development and its relationship with the environment were extensively identified in many of the United Nation declarations, (UN, 1992, 1997; UNESCO-CONNECT, 2005). The results of the research conducted by Prince (2010) seem to support UN declarations. She stated that as children are the decision-makers of the future, the values of sustainable living needs to be instilled at an early age through an integrated early years curriculum. She also stressed the importance of curriculum based learning experiences children can begin to take the first steps on the life long journey of sustainability.

Based on the thoughts and suggestions of the interviewees and literature that supports their views, it would be safe to conclude that the environmental content of the Turkish National Curriculum can be enriched by increasing the frequency of *action, active, participation, renewable* and adding *sustainable development* to the entire curriculum. Adding these environmental vocabularies to the curriculum starting from early ages not only would enrich the environmental content but also exposing students to these concepts would increase their conscious towards the environment.

Environmental activities

The selected curricula were analyzed to determine the number and type of environmental activities in each one of them. The environmental activities were

analyzed under four categories: raising awareness activities, critical thinking activities, action-based activities and research-based activities.

Based on the results of the content analysis of the environmental activities it can be said that although all of the activities in the UNEPMS curriculum seem to be distributed rather evenly under four types of activities, the highest number of activities aim at raising awareness by worksheets and lectures that take place in the classroom. It can be seen in the UNEPMS that action-based activities supported real life applications and skills, encourage political action and eco-management that requires the acquisition of knowledge of human impact on the environment and ways to decrease that negative impact. The similar result has been found in the OEC, the majority of the activities are related with teaching to raise awareness. In the OEC curriculum, it has been found that action-based activities were more related with eco-management and real life. A few action-based activities that encourage hands on activities take place in the OEC. Research-based activities appear to take the highest place in the IBPYP curriculum. It has been found that the majority of the activities in the BNC are action-based activities that intend to teach real life skills that take place in the nature and field. Findings of this research illustrated that action-based environmental activities in the BNC included a variety of types. It can be seen that real life applications that take place in the nature are highly supported in the BNC. It has also been found that environmental education in Britain supports and promotes cooperating with NGOs. Thus, it might be interpreted as although the number of environmental objectives were low and environmental key words such as *action*, *active* and *participation* were not the most frequent words in the BNC, high number of action-based activities and cooperation between the schools and NGOs seem to

impact and increase environmental behaviour even in the low income areas in the Britain as presented by Copeland (1976), Harris (1991) and Power (2003).

The analysis of the environmental activities revealed that the majority of the environmental activities in the MEB curriculum are related with raising awareness. Majority of the raising awareness activities take place in the *life science* curriculum while the rest of them were distributed evenly in the social studies and science curriculum. Findings of the analysis of environmental activities in the MEB curriculum will be presented and explained in detail below.

Action based activities in the MEB curriculum

Action-based activities can be described as hands on activities that students learn by doing things and where students are directly involved in directing the activity as active participants. Addition to main characteristics of action-based activities within this study for further detailed analysis of the action-based activities some categories were used: persuasion, consumer action, political action, eco-management, individual and collaborative action-based activities.

It has been found that a small number of action-based activities appeared in the MEB curriculum. Majority of the action-based activities take place in the science curriculum while there is no action-based activity in the social studies curriculum in the MEB. It has also become evident that there is one action based activity in the *life science* curriculum. Detailed analysis of the action-based activities presents that action-based activities in the MEB curriculum put focus on real life and eco-management activities. It can be seen that action-based environmental activities in

the MEB teaches both individual and collaborative skills to the students although collaborative skills were given more emphasis. The findings show that persuasive, political and consumer action activities do not appear in the MEB curriculum.

Interviews

Regarding action-based activities in the MEB curriculum the educators interviewed felt that the number of action-based activities in the MEB curriculum seem low and need to be increased. Educators suggested that MEB should increase the number of action-based activities that give opportunities to the students to develop attitudes, behaviour, and habits which lead to protection of the environment. They also mentioned that these activities should take place in the nature or natural place of the issues. Educators noted that real life experiences should be given by the activities that encourage psychomotor, emotional, and cognitive development in order to have permanent learning and real understanding that would lead students to participation and action. Educators and NGO officials stressed the importance of real life skills and learning by doing things. They stated that the number of activities that take place in the nature should be raised in a way that would give students more involvement and active engagement with the nature. NGO officials also suggested that MEB schools and NGOs to cooperate in order to organize action-based activities and training for teachers regarding the effective teaching strategies to teach environmental objectives to students.

Related research

There are numerous researches on how action can be taught to the students seem to provide supporting evidence to interviewees' suggestions. Dewey (1916) pointed out

education is not only a place to gain content knowledge but also a place to learn how to live. The purpose of education should not revolve around the acquisition of a pre-determined set of skills, but rather the realization of one's full potential by experiencing it and the ability to use those skills in real life for the greater understanding that would lead students to act in real life situations. Similarly, Hines et al. (1986) stated that being familiar with the environmental problems and causes would help students to understand how they should act to decrease their impact on the environmental issues as well as learning to take action toward to find solutions to them. Wilson (1996) supported above statements by noting that young learners learn best by interacting with the environment, inquiring about the components of the environment, and having a direct interaction with it. According to Wilson (1996) young learners should not be expected to *watch and listen* for any length of time, nor should they be expected to always follow the teacher's lead or agenda. As such experiences play a critical role in life-long shaping attitudes, values and pattern of behaviour should be taught (Tilbury, 1995). Importance of action-based activities also acknowledged by Hart (1997) who noted that the primary source of environmental study should not be the classrooms with textbooks. Students should be exposed to different environments and nature while they are learning about the environment. Layrargues (2000) also emphasized the importance of educating students by teaching them everyday problems on local issues. In a similar recent research, Kollmuss and Angyeman (2010) noted that students learn best by interacting with the natural environment. They have found out that increases in knowledge and awareness did not lead to pro-environmental behaviour. This behaviour was defined by them as "that consciously seeks to minimize the negative impact of one's action on the natural and built world" (p. 240). Only a small fraction

of environmental behaviour that can be seen in pro-environmental behaviour can be directly linked to environmental knowledge and environmental awareness. Kollmus and Angyeman (2010) suggested that to be able to teach pro-environmental behaviour, educators should give students opportunities to practice it with different activities that take place in the natural environment until it becomes a habit.

Based on the thoughts and suggestions of the interviewees and related literature seem to support them strongly, it can be concluded that the number of the action-based activities in the MEB curriculum need to be increased. Increasing the number of action-based objectives in the MEB curriculum would strengthen and enrich environmental instruction which would enable students to act towards to protection and conservation of the environment. It can also be stated that action-based activities need to be added to the social studies curriculum to balance the types of activities in it. Action-based activities in the MEB curriculum can be varied by increasing the number of hands on activities and activities that take place in the nature and in the field. Persuasive and political action activities can be added to the curriculum to give students opportunities to deal with real life issues. A stronger and tighter cooperation between the NGOs and schools in Turkey would strengthen action-based environmental education.

Research-based activities in the MEB curriculum

Research-based activities are one of the types that have been used to analyse the environmental activities in the selected curricula. Research-based activities teach conducting any stage of a research, application of surveys, inquiry and investigation.

The analysis of the environmental activities in the MEB curriculum presented that a small number of research-based activities have been found in the *life science*, social studies and science curricula where majority of them take place in the MEB science curriculum. The findings of the study show that there is equal number of research-based activities in the *life science* and social studies curricula.

Interviews

The educators and NGO officials interviewed expressed their thoughts on research-based activities during the interviews. They have suggested that for students to have an enduring understanding which would lead them to action and participation, the activities at the schools should aim to teach a variety of activities that give students opportunities to use research skills. It was stated by the educators interviewed that students should do investigations and research on their own environment, ask questions and find the reasons for issues. If they find the reasons of the environmental issues it would be easier for them to find solutions to these issues. NGO officials stressed the importance of independent questioning and investigation skills. They have noted that students should learn to question and criticize the systems and structures in place and find out the right ways to deal with the environmental issues by research, investigate and inquire.

Related research

Review of related literature shows that thoughts and suggestions of the interviewees on research-based activities supported by various researchers. Dewey (1916) pioneered project based learning, which is an instructional approach built upon authentic learning activities such as investigating the real life situations, answer

and/or ask questions, and solving problems by doing research. He suggested that students learn by doing things and living in a community that give them real, guided experiences which fostered their capacity to contribute to society. Hart (1997) also advocated teaching research-based activities to the students and he stated that the main goal should be preparing our students not for this society but a *better society* by letting our students to research, plan and act towards the solutions of environmental issues. Chawla (1999) was another researcher highlighted importance of research skills to take action. She stated that time spent outdoors in the natural areas by doing investigation and researches are the valuable activities that would trigger students' interest and lead them to take action. Similarly, Short (2010) advocated issue investigation model which helps students to develop questioning and inquiring that can facilitate greater environmental awareness, analysis, and action skills to act.

Based on the suggestions of interviewees and literature that provide supporting evidence to their suggestions, it can be concluded that increasing the number of research-based activities in the MEB curricula would encourage students to question, inquire and investigate the structures around them that feed into the environmental problems and finding out and implementation of the solutions to these environmental issues. It can be stated that more activities related with research and inquiry also would trigger students' curiosity and enthusiasm towards the environment which would create more connection between them and the nature.

Critical thinking activities in the MEB curriculum

In this research one of the activity types that helped to analyse environmental activities were critical thinking activities. Critical thinking activities intend to teach

higher order thinking skills by discussions, analysis, problem-solving, synthesis and evaluations. The analysis of the environmental activities in the MEB showed that there are a few critical thinking activities that take place in the MEB curriculum. No critical thinking activities have been found in the *life science* curriculum. It can be seen that there are more critical thinking activities in the science curriculum than social studies curriculum in the MEB.

Interviews

Educators and NGO officials expressed views which emphasized the importance of critical thinking skills and related activities in the students' learning to take action. Educators implied that teaching higher order thinking skills such as abstract thinking skills and critical thinking skills should start with the early childhood given opportunity to ask why and how questions.

Related research

The related literature on critical thinking activities supports thoughts and suggestions of interviewees. Tilbury (1995), Emmons (1997) and Jensen and Scnack (2006) emphasized the importance of critical thinking skills, reflection, democratic values and acquisition of knowledge of human impact on ecology and ecological problems. Hart (1997) specifically mentioned that teaching different perspectives to the students would improve their critical thinking skills and lead them to develop dialectical thought which can be defined as democracy education. Hart advocates that without democracy education student participation to action cannot be succeeded. Jensen et al. (1997) also supported education for democracy which teaches students participation and action by teaching them higher order thinking skills. Similarly,

Short (2010) stressed the importance of teaching higher order thinking skills that enable students explore, think, connect and understand the world they live in.

It is evident from the literature and suggestions from the interviewees that adding and increasing the number of critical thinking activities would enrich and strengthen students' higher order thinking skills in terms of environmental education. It also would give students opportunities to think more critically and dialectically which would lead them to see what can be done better in the world around them for a better environment.

Environmental assessment

Because the studied curricula do not give extensive and sufficient information on environmental assessment strategies, findings about general approach to assessment in the selected curricula was presented in this research. The information on assessment in the selected curricula was grouped as formative assessment and summative assessment for analysis and comparison.

Formative assessment provides information that is used in order to plan the next stage in learning. Formative assessment aims to promote learning by giving regular and frequent feedback which helps students to improve knowledge and understanding, to foster enthusiasm for learning, to engage in thoughtful reflection, to develop the capacity for self-assessment, and to recognize the criteria for success. Summative assessment aims to give teachers and students a clear insight into students' final understanding which usually takes place at the end of the teaching process and gives teachers, students, and parents information about a students'

understanding. The results of the summative assessment usually feed into the school grade reporting.

According to the analysis of the approach to assessment in the UNEPMS it has been found that pretesting (formative assessment) has a great value when an instructor is beginning a new unit or commencing to work with a group of unfamiliar students. In general the teaching model (UNEP, 1994) post-testing (summative assessment) is a term that describes the evaluation that will take place upon the completion of the teaching process. It has also been found out that assessing students' progress through the learning sequence (formative assessment) was valued more in the UNEPMS. It has been found that OEC promotes developing and implementing transparent assessment mechanisms for monitoring student achievement in environmental education which supported by formative and summative assessments. The analysis of the assessment approach of the assessment showed that the prime objective of assessment in the IBPYP is to provide feedback on the learning process which also can be defined as formative assessment. It implies that where possible, IBPYP provides an effective means of recording students' responses and performances in real life situations that present real problems to solve. These authentic assessment strategies suggested by IBPYP may be used in conjunction with other forms of assessment in order to give feedback and improve student learning. It has been found that assessment in the BNC at Key Stage one and two is made up of tasks and tests. Instead of authentic assessment strategies and tools, BNC support tasks and final assessment such as tests that designed to help inform the teacher regarding student achievement for each child. It can be seen in the BNC that assessing student knowledge with the summative assessment emphasized more.

The analysis of the assessment approach in the MEB change in the early years and in the grades four and five. Although the written final tests are not allowed in the grades Kindergarten through third in the MEB, the number of required written summative tests go up to minimum two for each subject area for each semester for grades four and five. It has been found that the number of formative assessments decrease when the students get older in the MEB curriculum.

Related research

Although none of the interviewees expressed their thoughts on assessment strategies and environmental assessment that support action based instruction there are some research evidence that increased use of formative assessment helps students to make improvement in their learning and understanding. Garrison, Chandler and Ehringhaus (2009) acknowledge the impact of formative assessment on student learning. They mention that assessment should be a key component to the curriculum and should not separate from the teaching and learning process. Burke (2010) also advocates a balanced assessment approach and suggests both formative and summative assessments should be integrated seamlessly into instruction for an effective learning experience.

Based on the analysis of the assessment approach in the curricula and related research that suggest a balanced approach to formative and summative assessments, it can be said that increasing the number of formative assessment in the MEB curriculum would enrich student learning.

Implications for practice

The purpose of this study was to make recommendations for elementary schools from kindergarten to grade five in Turkey to include environmental topics in school curriculum that enable students to acquire certain knowledge, skills, and attitudes that will lead students to initiate action on finding and implementing solutions to environmental problems.

To this end some recommendations were made based on the curriculum analysis, thoughts of educators and NGO officials who were interviewed for this study and related research which supported the findings of this research as well as the thoughts of interviewees. The recommendations upon the development and improvement of an action-based environmental instruction in Turkey, key suggestions regarding environmental objectives, starting age to the environmental education, environmental vocabulary and activities provided from the study presented below.

Environmental objectives

Based on the results of the content analysis, thoughts of interviewees of this research and related study that supported their views, recommendations regarding environmental objectives can be given to improve environmental education towards an action-based curriculum. Therefore, it is recommended that environmental objectives in the MEB curriculum can be improved in a way to focus more on the environmental education that encourages and teaches action, critical thinking and research skills. The priority of increasing the number of environmental objectives should be on the *life science* curriculum because *life science* comprises of the lowest number of environmental objectives in the MEB curriculum.

The number of environmental objectives related with action should be raised in the entire MEB curriculum with special attention to grade one *life science* curriculum, grade one does not include any objectives that teach action, therefore adding more action related objectives would benefit the action-based instruction. Because objectives that teach research, investigation and inquiry do not take place in the MEB social studies curriculum research related objectives need to be added into it to enrich social studies curriculum towards an action-based content.

Starting age to environmental education

Based on the content and interview analyses and review of related literature it is recommended that the environmental content should be introduced at the age of four and the emphasis on environmental education should be increased in the early childhood curriculum. In order to enable environmental education to start with the early years of education it is also recommended to add more environmental objectives into the *life science* curriculum. As stated above, increasing the number of environmental objectives especially in grade one *life science* curriculum would ensure environmental education emphasized starting from early years of education in the MEB.

Frequency of environmental vocabulary

Based on the thoughts and suggestions of the interviewees and literature that supports their views and findings of this study some recommendations were made regarding the frequency of environmental words in the MEB curriculum.

Findings of the study revealed that some environmental key words appear rarely in the MEB curriculum. Therefore, some key words such as *action, environment, recycle, reduce, reuse, renewable, nature, and responsibility* should not only be included in the curriculum but also taught explicitly starting from early years. Some of the environmental words such as *participation* and *sustainable development* appear to be neglected in Turkey MEB curriculum. Therefore, *it is* recommended to include *participation* and *sustainable development* in the environmental objectives and activities in order to teach the terminology and shift the focus of the content of the curriculum towards an action based content for students to become familiar with the environmental concepts and to be able to discuss and talk about them as needed.

Environmental activities

Based on the results of the curriculum analysis, thoughts of interviewees and related research that support these results, some recommendations were made to improve environmental activities in the MEB curriculum in a way that enable students to acquire certain knowledge, skills, behaviours, and attitudes that will lead students to initiate action on finding and implementing solutions to environmental problems.

It is recommended that the environmental activities in the Turkey MEB curriculum should be improved to support following areas:

- More action based activities which would lead students to practice their knowledge, learn and improve critical thinking skills, investigate, and develop research skills should be added to the entire MEB curriculum.

- Because there is no action –based activities in the social studies curriculum, action-based activities need to be added to the social studies curriculum to strengthen the action component in the MEB social studies curriculum.
- The number of research-based activities should be increased in the social studies and *life science* curricula to strengthen the teaching of investigation, research and inquiry skills to the students.
- Because there is no critical thinking activities that take place in the *life science* curriculum it is recommended to add critical thinking activities in it to enable students to learn higher order thinking skills starting from early years of *life science* education.
- Action-based activities that support and encourage real life skills, political and consumer action and persuasive activities are recommended to increase and/or added to the MEB curriculum to enrich the action component of the curriculum.
- Democracy education that would teach students to understand different perspectives, their rights and responsibilities, and promote participation and action should be added to the content of the curriculum.
- Teaching and learning activities should be designed in a way to create direct activities that take place in the natural setting which encourages students to understand natural systems and make connections with nature.
- Instead of transferring knowledge and encouraging memorization, more hands on activities should be added to the teaching and learning activities that would help students to understand what they learn and put into the information into action.

- Because, cooperation between non-governmental organizations and the schools is very important to create a very powerful network for disseminating the theory and practice of environmental education connections between the school and non-governmental organization were recommended to be encouraged. It is evident that cooperation with the non-governmental organizations has a critical role in teaching action and active behaviour. It is recommended that strong and tight connections with non-governmental organizations should be a part of the environmental education in Turkey's MEB curriculum.
- Teacher education and necessary resources such as books, videos, field trips, and guest speakers should take place and support an effective environmental education.

Implications for further research

In this study, five curricula around the world, British National Curriculum, Ontario Environmental Curriculum, United Nations Environmental Program Environmental Curriculum for Middle Schools, Turkey Ministry of National Education Curriculum and International Baccalaureate Primary Years Programme, were analyzed and discussed in order to determine environmental focus, action based components, activities and assessment to make recommendations to enrich environmental education in Turkey Ministry of National Education Curriculum.

Potential further research could include the collection and analysis of teacher training on environmental education, determining to what extent and how teachers are trained to incorporate action-based objectives, activities and assessment strategies. Teacher

training is very important in environmental education because teachers will be the main resource and the role model for students.

It can be suggested that teacher education courses, technical and further education programmes across institutions, systems, regions, or whole countries, need to train teachers with the aim of identifying opportunities for, and strengthening and mobilizing education. As the role models for the students it is very critical teachers to demonstrate a personal interest in and enjoyment of the natural world. Because of a teacher's expressions of interest in and enjoyment of the natural world are critical to the success of an environmental education program teaching training on environmental education is important.

Another potential further research could be on action based activities in order to determine the best ways to implement them. It can also be researched that the prolonged affects of the action based activities on the students and the impact on the parents and siblings of the students.

Limitations

1. Number of curricula analysed: Only five curricula were analysed due to language of the curricula.
2. Generalizations: Recommendations and sample lesson plans will only be valid for Turkey as interviewees gave their ideas for Turkish curriculum only and their ideas were used to make recommendations to improve environmental education in

Turkey's MEB curriculum. Educators and non-governmental organization officers mentioned their experiences and suggestions regarding Turkey's MEB curriculum and Turkish people. Thus, the recommendations and lesson plans that reflect their opinion are valid only for the country of Turkey.

3. The number of the non-governmental organization officer interviewees: The officers were hard to reach and hard to interview due to their work load. More thoughts and ideas of the non-governmental organization officers would enrich the recommendations made to improve an action based environmental education in Turkey.

4. The five curricula were analyzed by the researcher only.

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APPENDICES

Appendix A: Interview questions for educators

1. Environmental education should focus on ensuring every age group has environmental education according to United Nations Tbilisi conference on environmental education. What age group would be the right age to start environmental education?
2. What can be the right approach in EE to make people act towards solutions to environmental problems?
3. Do you think primary school students could address environmental issues?
4. How can primary school students address environmental issues?
5. What goals and objectives need to be incorporated in an action based environmental education for Turkey?
6. What kind of activities need to be incorporated in an action based environmental education for Turkey?
7. In environmental education curricula around the world, action based education starts after 5th grade. Students younger than 6th grades are educated for awareness only. Do you think educating young kids for awareness only is a right approach in education, why?
8. What is the right age group to learn critical thinking, problem solving, evaluation, and looking for solution to real life issues?

9. What do you think about the environmental education in the Turkish curriculum? How has it developed?
10. Do you think environmental education in Turkish curriculum is effective and adequate enough?

Appendix B: Interview questions for non-governmental environmental organizations

1. What environmental issues does your organization deal with?
2. How do you try to deal with those issues?
3. What age groups do you mainly deal with? Why?
4. What approach do you use with those groups? (Talks, slide shows, projects)
5. What success do you have using this approach?
6. Do you think primary school students could address these issues? How?
7. What age group do you think would be appropriate to start environmental education?
8. What can be the right approach in EE make people act towards solutions to environmental problems?
9. In what ways non-governmental organizations can cooperate with schools to empower environmental education?

Appendix C: Lesson plans

According to the recommendations that were prepared considering the curriculum analysis and thoughts and suggestions of the interviewed educators and non-governmental organization officials, sample lesson plans on sustainability for kindergarten to grade five were prepared.

As it is concluded in Chapter 5, sustainable development is one of the major environmental concepts which can be strengthened in Turkey MEB curriculum. Sustainable development and its relationship with the environment explicitly identified in United Nation declarations (1992, 1997; UNESCO-CONNECT, 2005) which emphasizes the importance of sustainable development for the quality of life in a community; whether the economic, social, and environmental systems that make up the community are providing a healthy, productive, meaningful life for all community residents, present and future. Therefore, sample lessons plans including objectives, goals, sample activities and sample assessments were prepared on sustainable development. The following are sample lesson plans written by researcher on sustainable development.

Age Group: Kindergarten
<p>Objective:</p> <p>Students will explore the following to understand and identify sustainable development:</p> <ul style="list-style-type: none"> • Water systems and water use at school • Students will identify an issue regarding water systems at home or at school • Students will find and state a solution to solve the issue • Students will try to identifying possibilities for changes in their behaviour or that of others, changing procedures or systems altering the physical environment to resolve the issue
<p>Goals:</p> <p>Students will understand the following and find out a solution to an issue regarding:</p> <ul style="list-style-type: none"> • Importance of water to all lives • How to sustain water for future
<p>Sample Activity:</p> <p>Students will plant a number of the same kind of fast growing plants in the garden (a designated area for planting). What does a plant needs to grow will be discussed, the importance of the water will be observed and recorded (if students cannot write, they will draw a picture of the state of the plants everyday). Half of the plants will be watered regularly and the other half of the plants will not be watered, the state of the growth of the plants and the reasons of growth or not growth will be discussed at the end of the experiment.</p> <p>Students will investigate:</p> <ul style="list-style-type: none"> • where water comes from and where it is stored • ways to save water and apply them at home and at school and record the actions and outcomes • students will discuss what would happen if there is no water • our responsibility to save water <p>Activity Type: Investigational, action based</p>
<p>Sample Assessment:</p> <p>Students will be interviewed to find out why the plants that hasn't been watered regularly didn't grow and possible outcomes if the other living things do not have enough water</p>
<p>Environmental vocabulary:</p> <ul style="list-style-type: none"> • Sustainable development • Water systems • Natural environment • Responsibility

Age Group: Grade 1

Objective:

Students will explore the following to understand and identify sustainable development:

- Use of materials and products at home and at school
- Caring for the misuse and overuse of materials
- Students will identify an issue regarding materials and products at home or at school
- Students will find and state a solution to solve the issue
- Students will try to identifying possibilities for changes in their behaviour or that of others, changing procedures or systems altering the physical environment to resolve the issue

Goals:

Students will understand the following and find out a solution to an issue:

- What basic products we use daily at school
- Sources of some materials used in everyday products
- Procedures for waste avoidance and minimization

Sample Activity:

Students will work on a weekly project: They will make a list of products that they use every day at school. The lists will be shared with a group and choose one common product. As a group students will find out what materials are these products made out of and the sources of these materials. Students will search the product, materials and sources on the internet, NGO officers determined by the teacher and their teacher. They will go to field trips to see where and how these certain products are produced, and where the raw materials come from. Students will also visit where raw materials come from (if applicable- e.g. if students choose pencil as their daily product they can visit some forests to see and learn what pencil is made out of). At the next step students will find out whether these sources and materials are non-renewable, there are any local procedures to sustain these resources and materials. If there are no systems in place, students will search ways to sustain these materials and sources; if there are local systems in place students will determine how effective they are with the support from NGO officers and teachers.

- Students will do the same activity at home and group with the students who live in the same neighbourhood
- Students will make products to use at the school and home using recycled materials e.g. foot mat from bottle tops
- Students will discuss their responsibility to avoid and minimize waste
- Students will make an action plan that shows how they will minimize waste and reuse some materials

Activity Type: Research-based; Problem-solving

Sample Assessment:

Individually, students will prepare a chart that show which daily product is made out of, source and whether there is any procedure or system for waste avoidance. Students will present their chart to the classroom.

Environmental vocabulary:

- Renewable
- Non-renewable
- Sustainable development
- Recycle
- Waste
- Responsibility
- Action

Age Group: Grade 2

Objective:

Students will explore the following to understand and identify sustainable development:

- Usage and misuse of paper
- Where paper comes from
- Students will find and state a solution to solve the issue
- Students will try to identifying possibilities for changes in their behaviour or that of others, changing procedures or systems altering the physical environment to resolve the issue

Goals:

Students will understand the following and find out a solution to an issue:

- How paper is produced
- How paper is misused
- Personal responsibilities to reduce misuse
- Exploring sustainable ways to reduce misuse of paper

Sample Activity:

Students will visit classrooms in small groups for a week towards the end of the school day and determine how much paper is used and being thrown in the garbage. After one week, students will present their data in the classroom. The next week they will visit a paper factory (if there is one in town otherwise they will watch a video of paper production). They will observe and listen from a speaker (e.g. a worker from the factory) how paper is produced and where raw material come from. Students will also observe how paper is produced using trees. They will find out the number of trees used to produce certain number of paper; how and where trees grow. They will prepare a presentation for the school assembly by synthesizing their inventory on daily usage of paper at the school, how paper is produced, how paper misuse affect environment and personal responsibilities on reducing paper usage.

- Students will establish an environmental committee and contact with a non-governmental organization with the help of their teacher
- Students will start a school-wide recycling program. They will set up bins in convenient places where they will be easy for students to find: in the lunch room, by garbage cans, and in classrooms. Students will encourage everyone to participate in the program by holding sessions in each classroom that explain what type of material goes where, why we should recycle and the good that recycling can do.
- Students will generate some other ways to reduce paper usage cooperating with non-governmental organizations and older students e.g. teachers can put homework assignments online, have students write blog posts for a classroom blog on computers instead of paper, or put some content in MP3 format to work with music players or home computers, encouraging school community to use both sides of the paper and use old pages for scrap paper, suggesting teachers to decrease the amount of handouts they distribute.

Activity Type: Research-based; Problem-solving; Action-based

Sample Assessment:

Students will be asked to make a weekly inventory to find out paper usage at their home. Students will be asked to cooperate with their parents to work on an action plan to reduce paper usage at home and present their action plan at the school.

Students will observe paper reduction and recycling throughout the project

Environmental vocabulary:

- Responsibility
- Recycling
- Reducing
- Participation

<p>Age Group: Grade 3</p>
<p>Objective:</p> <p>Students will explore the following to understand and identify sustainable development:</p> <ul style="list-style-type: none"> • Energy systems and energy use at home and school • Students will find and state a solution to solve the issue • Students will try to identifying possibilities for changes in their behaviour or that of others, changing procedures or systems altering the physical environment to resolve the issue
<p>Goals:</p> <p>Students will understand the following and find out solution to a sustainable issue:</p> <ul style="list-style-type: none"> • Sources of energy used in our lives. • Uses of different forms of energy in our lives (including heat, light, sound and mechanical) • Systems that provide energy for personal use • Exploring sustainable energy source • Ways of saving/conserving energy in the immediate environment
<p>Sample Activity:</p> <p>Students will visit a local power station to observe how electric is generated; an electrical engineer will give a presentation about power sources and what environmental friendly means. At the end of the field trip and presentation students will have time to draw how electricity is generated and transferred into the residences. Students will also research (by asking questions or searching internet) how environmental friendly the power station is</p> <ul style="list-style-type: none"> • Students will find out about where power comes from in our homes by talking to their parents and the doormen, will prepare a short report about their research • Students will find out how much environmental friendly the power source is • According to the result as a group who live at the same area will create an action plan and a solution; they talk to the municipality (by making appointment) in order to express their findings (by PowerPoint presentations and hand outs) about power source and what possible solutions can be • Students will self-reflect on their participation level and the result • <p>Activity Type: Research-based; Problem-solving; Action-based</p>
<p>Sample Assessment:</p> <ul style="list-style-type: none"> • Students will be asked to interview and do peer-evaluation about the power sources at home and will use a rubric generated by the teachers and the students after their field trip • Students' meeting with the municipality and solutions will be followed and evaluated by the teacher

- Students will reflect on their solutions, outcome of their meeting with the municipality and how it can be improved

Environmental vocabulary:

- Sustainable development
- Energy sources
- Action
- Participation

Age Group: Grade 4

Objective:

Students will explore the following to understand and identify sustainable development:

- Ecosystems and local environment
- Students will find and state a solution to solve the issue
- Students will try to identifying possibilities for changes in their behaviour or that of others, changing procedures or systems altering the physical environment to resolve the issue

Goals:

Students will understand the following and find out a solution to an issue:

- Different species in the ecosystems
- Relationships between species in simple and complex ecosystems and food chains
- How we can assess the wellbeing of the natural environment and our community by observing, taking samples, measuring and comparing, and discussing results obtained over a period of time
- How can we sustain the health and wellbeing of the environment

Sample Activity:

Students will investigate a local ecosystem in order to find out living things and organisms exist in that ecosystem. After the investigation students will do a research on how these organisms contribute to well being of an ecosystem.

Students will need following materials:

An outdoor area like a field or patch of garden.
String
Magnifying glass
Thermometer
Popsicle sticks
Paper
Small gardening tools

Students will locate a small patch of land to examine. They will use string to partition a small size segment. They will write their observations in their ecosystem notebook. They will write down all living and non-living things. They will also record temperature. Students will turn over some parts of the land to observe, examine and note what living and non-living things exist beneath surface. They will take some samples in their experiment tubes to examine at the science laboratory back at school.

Students will ask and find answer of some question e.g:

Consider the variety of living and non-living things in your ecosystem.
Which was the largest population?
How are the survival needs being met in your ecosystem? Air? Food?
Water? Sunlight?
How do these living and non-living things influence well being of the

<p>ecosystem? What is our affect on the living and non-living things in that land? How we help sustain their ecosystem Students present their investigation and results in the classroom.</p> <p>Activity Type: Research-based</p>
<p>Sample Assessment:</p> <ul style="list-style-type: none">• Students investigation will be observed during and feedback will be given• Students' investigation, examination and presentation will be evaluated using a rubric created by the students and the teachers according to the objectives and goals.
<p>Environmental vocabulary:</p> <ul style="list-style-type: none">• Sustainable development• Ecosystem• Food chain• Responsibility

Age Group: Grade 5

Objective:

Students will explore the following to understand and identify sustainable development:

- Weather and climate
- Caring Earth and different parts of it regarding climate
- Students will find and state a solution to solve the issue
- Students will try to identifying possibilities for changes in their behaviour or that of others, changing procedures or systems altering the physical environment to resolve the issue

Goals:

Students will understand the following and find out a solution to an issue:

- Difference between weather and climate.
- Patterns, trends and longer term changes to climate.
- Systems put in place to manage weather and extreme weather events.
- Effect of extreme weather events on the ecosystems
- People effect on the weather, different perspectives

Sample Activity:

Students will work on a project which comprises different assignments, investigations, research, interviews and a final product. Students will research the weather history of their city over the past ten years. They will need to research old news papers, articles, news and will talk to people who have lived in the community for some time. They will visit local weather observation station and locate weather data. They will search for change in the patterns of weather. Students will also choose one area in their local community such as economy, agriculture, population, plants types and quantity in order to make a connection with the weather change. They will make a research on how weather changes affect one of these areas. They will visit a certain local area to find out what changes occurred. Students will make a poster that will show their research process and all of their findings. They will determine an area of an issue, the reasons of the issue, and effects of that issue and how it can be solved in a sustainable way. Students will work with teachers from the secondary school in order to get help, mentoring and supervision. If the school is only a primary school, students will get some help from the local community.

- Students will present their findings to the school community and open up a debate
- Students will discuss their responsibility on climate change
- Students will discuss the steps of action

Sample Assessment:

Teachers, peers, older students or people from the community will give observe and give feedback to the students throughout the process. Students' final poster, research, interviews and essay will be evaluated in order to give feedback to the students about how this project is improving and how

beneficial the sustainable solutions are for the community.

Environmental vocabulary:

- Sustainable development
- Ecosystem
- Agriculture
- Responsibility
- Action