MOLDOVA STATE UNIVERSITY

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THEORETICAL AND METHODOLOGICAL APPROACHES OF ENVIRONMENTAL EDUCATION WITHIN PRIMARY SCHOOLS IN THE ISRAELI ARAB SECTOR

531.01. – General Theory of Education

PhD thesis in pedagogy

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CUPRINS

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ANNOTATION

Author: Rania Shalash

Theme: *Theoretical and Methodological Approaches of Environmental Education within Primary Schools in the Israel Arab Sector.* **Doctoral Thesis in Pedagogy, Chişinău, 2017**

Thesis structure: Annotations (in Romanian, Russian and English), introduction, three chapters, general conclusions and recommendations, bibliography (207 sources), 17 annexes, 177 pages of the basic text, 42 tables, 15 figures.

Key concepts: Environmental Education, Environmental Literacy, Sustainability, Sustainable Development, Education for Sustainable Development, Environmental Programs, Green School Program, Environmental Perceptions.

The research domain: General Theory of Education.

The research goal is: to analyze the theoretical framework of the EE programs impact on ecological literacy of students and the environmental perceptions of students and teachers and to develop the methodology integration of EE in the curriculum at the primary level in the Israel's Arab sector.

The research objectives are: to analyse the theoretical aspects of EE through extrapolate from the current EL of students in sixth grade in primary schools in the Arab sector, in general; to identify the EE methodological items by comparing the link between EL components (knowledge, attitudes, behaviors and skills); to evaluate the impact of the contextual training factors (source of knowledge, sex, education level and occupation of parents, time spent outdoor) on EL of students in sixth grade; to develop an intervention program in order to prepare teachers to integrate EE into their study plan to improve the EL of students in sixth grade; to determin the impact of the intervention program on EL of students from the sixth grade and on environmental perceptions of teachers and students involved in the process.

Scientific novelty and originality of the research: Using ecocentric, antopocentric and sustainable environmental development approaches in the elaborated methodology of integration of EE in primary education in the Arab sector of Israel, focused on knowledge, strengthening perceptions and responsibility, boosting involvement, actions and practical aplications. Elaborating the methodology which will contribute to improve student's EL focused on turning complex conceptual theoretical precepts, priority policy and international environmental science.

The important scientific problem solved in the research was to analyze the theoretical and methodological aspects of the impact of the ecological literacy programs on the students from the sixth grade in the Arab sector from Israel and ecological perceptions of students and teachers about them in terms of harnessing the intervention program for teacher training in environmental education field in order to streamlining sustainable approach of the environmental behavior.

Practical value of the research: The research results can be used to implementate the EE programs in formal and informal context, in order to support the educational institutions, especially those in the Arab sector, to create and implement programs working models and teaching methods in environmental programs. The research conducted to considerable practical contibutions on teachers training in EE. The recommendations will influence educational leaders and decision-makers and will contribute to promoting quality EE in primary schools of the Arabic sector. They will also influence the promotion of education for sustainable development through training programs, through involvement and adequate environmental behavior. Education for sustainable development is important for creating a citizenship responsible behavior and civic values worthy for present and future.

Implementation of the scientific results: The experimental research took place in the state primary schools in the Arab sector, in terms of contextual-holistic educational process, through scientific publications, through practical activities with students, with school and university teachers.

ADNOTARE

Autor: Rania Shalash

Temă: *Repere teoretice şi metodologice ale educaţiei ecologice în învăţământul primar din sectorul arab al Israelului,* **Chişinău, 2017**

Structura tezei: introducere, 3 capitole, concluzii generale şi recomandări, bibliografie (204 surse), 156 de pagini de text, 35 de tabele, 15 figuri, 7 anexe, adnotări (în română, rusă şi engleză), lista abrevierilor şi glosarul. Rezultatele obţinute sunt publicate în 7 lucrări ştiinţifice (5 articole din reviste naţionale şi 2 comunicări la conferinţe internaţionale).

Concepte-cheie: educaţie ecologică, alfabetizare ecologică, sustenabilitate, dezvoltare durabilă, educaţie pentru dezvoltare durabilă, programe ecologice, programul „Şcoala verde", percepţii ecologice.

Domeniul de cercetare: Teoria generală a educaţiei.

Scopul cercetării constă în analiza cadrului teoretic al impactului programelor de educaţie ecologică asupra nivelului de alfabetizare ecologică a elevilor şi asupra percepţiilor de mediu ale elevilor şi profesorilor şi elaborarea metodologiei de integrare a educaţiei ecologice în planul de învăţământ în treapta primară din sectorul arab al Israelului.

Obiectivele cercetării: analiza reperelor teoretice ale educaţiei ecologice, prin extrapolarea acestora la nivelul actual de alfabetizare ecologică a elevilor din clasa a şasea din şcolile primare din sectorul arab, în general; identificarea reperelor metodologice ale educaţiei ecologice prin compararea legăturii dintre componentele alfabetizării ecologice (cunoştinţe, atitudini, comportamente şi competenţe); evaluarea impactului factorilor contextuali de formare (sursa cunoştinţelor, sexul, nivelul de educaţie şi profesia părinţilor, timpul petrecut afară/în aer liber) asupra nivelului de alfabetizare ecologică a elevilor din clasa a şasea; elaborarea unui program de intervenţie cu scopul de a pregăti profesorii să integreze educaţia ecologică în planul lor de studii, pentru a ameliora nivelul de alfabetizare ecologică a elevilor din clasa a şasea; determinarea impactului programului de intervenţie asupra alfabetizării ecologice a elevilor din clasa a şasea şi asupra percepţiilor profesorilor şi ale elevilor implicaţi în proces.

Noutatea ştiinţifică şi originalitatea cercetării constau în valorificarea abordărilor ecocentrică, antopocentrică şi sustenabilă de mediu în elaborarea metodologiei de integrare a educaţiei ecologice în învăţământul primar din sectorul arab al Israelului, constituită din cunoştinţe, consolidarea percepţiilor ecologice, creşterea responsabilităţii, impulsionarea implicării, a acţiunilor şi a experimentării la nivel practic. Metodologia elaborată contribuie la îmbunătăţirea nivelului de alfabetizare ecologică al elevilor, axat pe valorificarea conceptuală complexă a preceptelor teoretice, prioritare în politica şi ştiinţa despre mediu la nivel internaţional.

Noutatea ştiinţifică şi originalitatea cercetării constau în valorificarea abordărilor ecocentrică, antopocentrică şi sustenabilă de mediu în elaborarea metodologiei de integrare a educaţiei ecologice în învăţământul primar din sectorul arab al Israelului, axat pe oferirea de cunoştinţe, consolidarea percepţiilor ecologice, creşterea responsabilităţii, impulsionarea implicării, a acţiunilor şi a experimentării la nivel practic. Metodologia eleborată contribuie la îmbunătăţirea nivelului de alfabetizare ecologică al elevilor, axat pe valorificarea conceptuală complexă a preceptelor teoretice, prioritare în politica şi ştiinţa despre mediu la nivel internaţional.

Problema ştiinţifică importantă soluţionată în cercetare vizează analiza reperelor teoretice şi metodologice ale impactului pe care îl au programele de alfabetizare ecologică a elevilor din clasa a şasea din sectorul arab al Israelului şi a percepţiilor ecologice ale elevilor şi ale profesorilor cu privire la acestea, din perspectiva valorificării unui program de intervenţie pentru formarea cadrelor didactice în domeniul educaţiei ecologice, în vederea eficientizării abordării sustenabile a comportamentului de mediu.

Importanţa practică a cercetării: Rezultatele cercetării pot fi folosite ca fundament pentru implementarea programelor de EE în contexte formale şi informale, în susţinerea instituţiilor de învăţământ, în special pe cele din sectorul arab, să creeze programe şi să implementeze modele de lucru şi metode de predare în proiectele ecologice. Cercetarea realizată demonstrează rolul practic seminificativ al formării continue a profesorilor în EE. Recomandările formulate vor influenţa factorii de decizie şi vor contribui la promovarea EE de calitate în şcolile primare din sectorul arab. De asemenea, vor influenţa promovarea educaţiei pentru sustenabilitate prin intermediul programelor de instruire, prin implicare şi comportament ecologic adecvat. Educaţia pentru sustenabilitate este importantă pentru formarea cetăţenilor cu un comportament responsabil şi cu valori civice demne, pentru prezent şi viitor.

Implementarea rezultatelor ştiinţifice s-a produs în cadrul conferinţelor şi al experimentului în şcolile primare din sectorul arab din Israel în anii 2013-2015.

АННОТАЦИЯ

Автор: Rania Shalash

Тема: *Теоретические и методологические подходы к экологическому воспитанию в начальных школах арабского сектора Израиля.* **Диссертация на соискание ученой степени доктора педагогических наук, Кишинев, 2017.**

Структура диссертации: Введение, три главы, общие выводы и рекомендации, библиография (215 источников), 180 страниц основного текста, 41 таблица, 15 рисунков, 16 приложений, аннотация (на румынском, русском и английском языках), список сокращений, словарь терминов. Полученные результаты были опубликованы в 7 научных работах (5 статей в журналах национального уровня и 2 доклада на международных конференциях).

Ключевые слова: экологическое воспитание, экологическая грамотность, устойчивость, устойчивое развитие, образование в целях устойчивого развития, экологические программы, программа «Зеленая школа», экологическое восприятие.

Область исследования: Общая теория образования.

Цель исследования: Проанализировать теоритические основы воздействия программы экологического воспитания на уровень экологической грамотности учеников и над экологическим восприятиями учениками и учителями и разработать методологию интерграции экологического воспитания в учебном плане начальных школ из арабского сектора Израиля.

Задачи исследования: проанализировать теоритические аспекты экологического воспитания экстраполируя их yf текущий уровень экологической грамотности учеников шестиклассников из арабского сектора в общем; определение методологических аспектов экологического воспитания сравнивая существующие связи между компонентами экологической грамотности (знания, чувства, поведение и компетенции); Оценивать воздействие фоновых переменных (источник знаний, гендер, уровень образования отца, уровень образования матери, профессия родителей, время, проведенное на воздухе) на уровень ЭГ шестиклассников; разработка программы вмешательства, которая нацелена на подготовку учителей к внедрению ЭГ в учебные планы с целью повысить уровень ЭГ учеников; определить воздействие программы вмешательства на уровень ЭГ шестиклассников и на отношение задействованных учеников и учителей.

Научная новизна и оригинальность работы состоят из освоения экоцентрических, антропоцентрических и устойчивых подходов в разработке методологии интеграции экологического воспитания в системе начального образования в арабском секторе Израиля, фокусирован на предоставление знаний, на укрепление экологических восприятий, на повышение уровня ответственности и на стимулирование вовлечения, действия и применение на практике. Разработанная методология способствует улучшению уровня экологической грамотности учеников, на освоение теоритических аспектов, которые являются приоритом для политики и науки об окружающей среде на международном уровне.

Важной решенной проблемой в исследовании является анализ теоретических и методологических воздействий, которые имеют программы обучения экологической грамотности учеников из шестого класса в арабском секторе Израиля и экологические восприятия учеников и преподавателей по отношению к ним, с точки зрения внедрения программы для подготовки учителей в области экологического образования, с целью улучшения устойчивого подхода к экологическому поведению.

Прикладная ценность работы: Результаты исследования могут быть применены как основа для имплементирования програмы ЭВ в формальных и нонформальных контекстах для поддержки учебных учереждений, включая школ из арабского сектора, чтобы они разработали программы и применение рабочих схем и методов обучения в экологических проектах. Разработаное исследование доказывает значимость практической роли повышения квалификации учителей в отрасли экологического воспитания. Рекомендации иследования будут влиять над лицами принимающие решения и будут способстовать к продвижению качественного ЭВ в начальных школах арабского сектора, также будут влиять над продвижением воспитания для устойчивого подхода к окружающей среде при помощи образовательных программ, посредством действий и адекватного экологического поведения. Воспитание для устойчивого подхода к окружающей среде является важной для развития граждан с ответственным поведением и с гражданскими ценностями, достойные для настоящего и будущего.

Внедрение научных результатов: результаты были одобрены в рамках научно-прикладных конференций и применялись в начальных школах арабского сектора Израиля между 2013 и 2015 гг.

LIST OF ABBREVIATIONS

EE   - Environmental Education;

EL   - Environmental Literacy;

ESD   - Education for Sustainable Development;

EFS   - Education for Sustainability;

SD   -Sustainable Development;

CEO   - Chief Executive Officer

ERB   - Environmental Responsible Behavior

NPA   - Nature and Parks Authority

SPNI   - The Society for the Protection of Nature in Israel

IUCN   -The International Union for the Conservation of Nature

IEEP   - The International Environmental Education Programme

UNEP   - The United Nations Environmental Programme

WCED   - The World Commission on Environment and Development

UNESCO - The United Nations Educational, Scientific and Cultural Organization

UN   - United Nations

WSSD   - The World Summit for Sustainable Development

WEHAB - Water, Energy, Health, Agriculture and Biodiversity.

NAAEE - The North American Association for Environmental Education

EPA   - The Environmental Protection Agency

ROSA   - Rig-of-Safety Assessment

MSELI   - The Middle School Environmental Literacy Instrument

ELIKS   - The Environmental Literacy Instrument For Korean Students

CLES   - The Constructivist Learning Environmental Survey

ESELI   - The Elementary School Environmental Literacy Instrument

SSELI   - The Secondary School Environmental Literacy Instrument

INTRODUCTION

The actuality and the importance of the problem addressed: Today's students, who are actually tomorrow's leaders, need to be equipped for tomorrow's challenges. Teachers, who are in direct and constant contact with students, must prepare their students for the future they will inherit. They must provide them with Environmental Education (EE) that helps them become the educated thought leaders of tomorrow.

"Every educational act, conducted inside and outside the school, aims to provide knowledge on the physical and the human-social environment, to promote care and respect for the environment, the humans and the society and aims to develop skills to act for the physical and the human-social environment - is considered an environmental education (EE)" [158].

The concept "Environmental Education", first appeared in the United States of America in the late 60's of the last century when Stapp stated that the aim of EE is to create people with knowledge to bio-physical environment and its problems which have the motivation to work toward their solution [148]. Stapp and his colleagues believed that the major objects of EE are to encourage the people to acquire: (1) the understanding that man is part of a system and that he has the ability to change the interrelationship of this system, (2) the understanding of the biophysical environmental and its role in contemporary society, (3) the understanding of the biophysical environmental problems confronting man and how can these problems be solved and (4) the attitudes of concern for quality of the biophysical environment which will motivate citizens to solve problems concerning biophysical environment. Environmental education, even then, created the necessary connection between the deterioration in the situation of the environment in the twentieth century and the education for environmental responsibility.

In 1975, the International Workshop on Environmental Education, held in Belgard, produced a tentative framework for EE. The objectives of the EE were stated within this tentative framework [172]. According to the charter produced in Belgrad Workshop, the general goal of EE was to create generations of people that are aware of, concerned about, the environment and its associated problems, and which have knowledge, skills, attitudes, motivations and commitment to act individually, and collectively, toward solutions of current problems and prevention of new ones [172]. The objectives of EE in this Framework are based on awareness, knowledge, attitudes, skills, evaluation ability and participation.

In 1977, in the first Intergovernmental Conference on EE held in Tbilisi (in Georgia), the concept EE was detailed more precisely. The participants of the conference identified the aims, goals and objectives of EE. The basic aim of EE, as stated in the conference, was to succeed in making individuals and commonalities understand the complex nature of the natural and built environments resulting from the interaction of their biological, physical, social, economic and cultural aspects. Also to acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and the management of quality of the environment [169, P.25].

The main goal of the EE, as stated in the conference, were: (1) to increase awareness and interest in economic, social, political and ecological matters in the urban and rural areas; (2) to give people the opportunities to acquire the knowledge, values, attitudes, commitment and skills in order to protect the environment; and (3) to help individuals, groups and society as a whole to behave differently towards the environment [169].

The definition of EE done by Stapp et al. in 1969, the Belgrade Charter and Tbilisi Declaration were the early attempts to develop the area of EE. Recent definitions of EE are all based on these initial attempts. According to the definition of EE mentioned above, the fundamental aim of EE is to develop environmentally literate people who have responsible environmental behaviors [57; 58]. There is consensus among researches that Environmental Literacy (EL) is an outcome of EE programs and initiatives [83; 94; 175] and a fundamental goal of EE [20]. Goldman, Yavetz and Pe'er [44] identified environmentally literate person as "possessing the values, attitudes and skills that enable knowledge to be converted into action".

The EL Assessment Consortium consisting of EE scholars designed El framework based upon historical definitions, research and evaluation literature, and learning outcomes in EE [189;187]. The framework of EL includes: (1) Cognitive dimensions, (2) Affective dimensions, (3) Additional determinants of environmentally responsible behavior, and (4) Personal and group involvement in environmentally responsible behavior. All of the above provides evidences that EL includes four main categories; (1) knowledge, (2) Affect, (3) Skill, and (4) Behavior [53].

It was important for our information and for the exchange of experience regarding this research that, in the Republic of Moldova, the Concept of Environmental Policy of the country is adopted since 2001, which expresses commitment to ensure public access to the information in the field, including a more active training regarding decision making towards the environment and natural resources, in education and ecological training [205]. In 2014, was adopted a crucial regulatory document, The

Environment Strategy for 2014-2023 [206]. In 2008, first Curriculum for the ecological education was elaborated, and in 2015 it was updated and recommended by the National Council for Curriculum at the optional discipline of ecological education for the I-XII grades, being provided with didactic suport [204]. I have known about new essential contributions to the research and to the improvement of practice of environmental education and environment protection in Moldova of the environmental scientist I. Dediu, through the Encyclopedia of Ecology, and through the valuable materials from the Red Book of the Republic of Moldova [207]. We also investigated the contribution of T. Cozari scientist, specialist in biodiversity, ecology and ethology of plants and animals, including author of the first wildlife atlas made by a Moldovan [208]. Through outstanding contributions to environmental education in Moldova stands following reference names: L. Saranciuc-Gordea [209], N.Bîrnaz [210] V.Sochircă [210] etc. As support for pedagogical theory and general axilologic, I used data from his experience Vl. Gutu [212], the Larisa Cuzneţov [211], Goraş-Postca V. [213] of N. Silistraru, of M. Shevciuc, V.Panico etc.

The ministry of education in Israel has called for the prioritization of EE programs in schools. Many efforts have been devoted into the development of EE programs in the educational system in Israel. EE programs, such as the "Green school" program, on behalf of the ministry for the protection of nature, has gained tremendous recognition and are continually being introduced to schools in Israel in order to assist students in developing EL, and to become environmentally responsible citizens. Several schools have adopted these programs because of their effectiveness in improving the students' learning, their environmental literacy and the school's physical environment. However, on the one hand, the effectiveness of these programs and the students' environmental literacy level have not been evaluated enough and due to limited studies concerning the students' environmental education achievements in primary schools, especially in the Arab sector. This makes it difficult to state the degree of impact of environmental education programs on students' environmental literacy. On the other hand, the undertrained teachers for integrating environmental education in Israel reflects, to a large extent, the situation of the EE in the school system [42]. The striking figure in this topic is the lack of properly trained teachers for integration of environmental studies and environmental education as an interdisciplinary perception. Integrating EE in primary schools is excluded, by a limited extent, to science teachers only. Teachers are not trained enough to deal with the challenges of the environmental education as an interdisciplinary profession that combines social and ethical aspects with scientific knowledge and skills and that strives to shape behavior [42]. Accordingly, this research offers the teachers in primary schools in the Arab sector a special training program that aims to

provide tools to cope with the complexity of environmental issues within multi-disciplinary treatment of the existing problems, to prevent the creation of future problems. Also, this research aims to provide knowledge and awareness in different aspects of environmental science, to develop seeds of environmental educational leadership and above all, to raise the students' environmental literacy level.

The premises and contradictions mentioned above, have led to the formulation of the **research problem**: The effectiveness of EE programs, which were designed to raise the EL level of the students, and teachers' environmental perceptions, have not been examined enough, especially in primary schools of the Arab sector, because this situation affects a lot a situation of environment and sustainable development.

The **goal of the research** is to analyze the impact of EE programs (while comparing between green and non-green schools) on sixth grade students' EL level by identifying the environmental perceptions and perceptions concerning environmental programs of teachers and sixth grade students in green and non-green schools, in the Israeli Arab sector.

In order to achieve this goal six **objectives** were proposed:

1. To **evaluate** the existing EL level of sixth grade students while comparing between green schools and non-green schools.

2. To **compare** correlations between EL components (knowledge, attitudes, affect, behavior and skills).

3. To **analyze** the impact of background variables (source of knowledge, gender, parents' education level, parents' profession, time spent outdoor) on sixth grade students' EL level.

4. To **offer** an intervention program that focuses on training teachers to integrate EE in their work plan which aims to raise the students' EL level).

5. To **determine** the impact of the intervention program on sixth grade students' El level and on perceptions of teachers and students involved.

   The scientific novelty and originality of this research: Developing a new questionnaire that examines different dimensions of the environmental literacy (knowledge, attitudes, affect, behavior and skills) and suits the students in primary schools of the Arab sector; proposing an environmental program designed especially to train teachers to integrate environmental studies and environmental education as an interdisciplinary subject in order to raise the students' environmental literacy level at school; redefining and updating the meaning of the term "environmental literacy"; Highlighting the importance of identifying the environmental perceptions of students and teachers in order to develop appropriate environmental programs that aim to raise the students' environmental literacy level at

school; and determining a suitable theoretical and methodological framework to evaluate the students' environmental literacy level.

The scientific problem solved in the research is the ability to share all the teaching staff at the school in the process of integrating environmental education in all areas of teaching, and to provide tools and models of teaching that aim to the raising of the students' EL in the school.

The theoretical significance of the research: Most of the research literature that deals with EE, refers to programs focusing on students and their impact on the students' EL. There are not many studies on programs focusing on teachers and on their indirect impact on the students' EL. In addition, research literature revealed the lack of studies on evaluating the effectiveness of EE programs, of all kinds, and their impact on its participants. Recently, there is an educational awakening regarding the necessity of integrating EE, intensively and seriously , in primary schools in the country, as expressed in the declarations of the education system and the environmental institutions in the country. However, very few studies have evaluated the impact of environmental programs in primary schools of the Arab sector in Israel. This study investigated the effectiveness of an existing environmental program, and a unique educational program (designed especially for this research) that focused on Arab teachers, and aimed to increase the students' EL level, in primary schools of the Arab sector in Israel. The study has contributed to the understanding of the impact of EE programs, on the students' EL and the environmental perceptions of the teachers and the students involved. According to the above, this research contributes to the enrichment and establishment of the theoretical knowledge regarding the field of EE in the Arab sector of Israel with an emphasis on:

- Types of primary schools: green schools (with environmental programs) and non-green schools (without environmental programs).
- Types of environmental programs operating in primary schools: students' centered environmental programs and teachers' centered environmental programs.
- Diverse environmental perceptions of students and teachers in primary schools.
- Evaluation of the students' environmental literacy in primary schools.

The important scientific problem solved in the research was to analyze the theoretical and methodological aspects of the impact of the ecological literacy programs on the students from the sixth grade in the Arab sector from Israel and ecological perceptions of students and teachers about them in terms of harnessing the intervention program for teacher training in environmental education field in order to streamlining sustainable approach of the environmental behavior.

The applicative value of the research: The applicative value of the research is determined by experimental implementation of the intervention program, which focused on teachers and aimed to raise the students' EL level in primary schools of the Arab sector in Israel, and by highlighting the importance of teachers training courses. The intervention program focused on providing teachers with knowledge, tools, equipment, teaching methods and models concerning EE. It also aimed to strengthen the teachers' and students' environmental perceptions. The intervention program could serve as a model in order to raise the students' EL level in general, and to Arab students, particularly. This research seeks to make both a theoretical and practical contribution to the knowledge regarding the impact of EE programs on raising the students' EL level in primary schools of the Arab sector. This research extends the literature on EE in general and on EE programs in particular, by examining the impacts on the students' EL. Different from most previous studies of this topic, this study focuses on a teachers centered program and not on a students centered program, but with the aim of raising the students' EL level. The premise of this study is that teachers, who are in a direct and continuous contact with students and who are no less important in this context, can affect enormously on the students' El. Furthermore, this research extend previous researches by focusing only on special groups of citizens such as students in primary schools of the Arab sector in Israel. It is very important and essential to have qualified teachers to integrate EE in primary schools, especially in the Arab sector, in order to create environmentally literate generations of students. Israeli's best energies should be investigated in preparing primary teachers having qualities that will help students developing their EL, which is considered the main goal of EE. Thus, the motive of the present research stems from pedagogical concerns and interests. This study should be an interest to all teaching staffs in primary schools, especially in the Arab sector. It anticipates to attract scholars attention to Arab students' EL so that future studies investigate how best to help students to promote and maintain a high level of EL, which is a very important objective that the educational system strives to achieve.

Therefore, the importance of this study stems from the following:

- Most previous research on evaluating EL level has tended to focus on primary students in the whole country in general, and only few tended to focus on the Arab students in particular. Arab students face many obstacles: educational, social, political, cultural, and linguistically, therefore this understanding is very critical. This study focuses only on students from primary schools of the Arab sector.

- Most previous research on the impact of EE programs on students' EL level focused on students-centered programs. This study focuses on a teachers-centered program assuming

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that investments in teachers may lead to better impact on students, since they have stronger and permanent contact with students.

- Only few studies tested the environmental perceptions of the students and the teachers in primary schools of the Arab sector. It is essential to identify environmental perceptions in order to develop proper environmental programs that strive to raise the students' EL.

- The finding generated from other studies conducted in the Jewish sector cannot be generalized for the Arab sector for the reason that Arabs differ from Jews in their culture, socio-demographic and social-demographic characteristics. This study focuses only on students from the Arab sector, and takes into consideration the social, economic and pedagogical situations of the Arabs and its effects on students' EL.

- Finding of this research could draw guidelines to the profession of all teachers in primary schools and could provide self-criticism to their work in order to improve and empower their role. Practically, this research points to the significant role of teachers in integrating EE and to the importance of supporting them.

- Findings may help provide explanations and insights as well as recommendations to the educational leaders and decision-makers in order to integrate EE in primary schools, to create programs and implement work patterns and teaching methods in environmental projects particularly in the Arab sector.

- Findings can also shed light and provide us with information about the situation of EE in primary schools in the Arab sector of Israel.

- The research may contribute to understanding, improving and making future changes in the educational system concerning the existing EE programs.

Scientific approval of the results: The fundamental tenets and the conclusions were reflected in scientific articles and papers delivered at national and international magazines and international scientific conferences: the International Scientific Conference: Postmodern Education between efficiency and functionality, State University of Moldova, faculty of psychology and educational sciences, center of research in educational, social and humanitarian sciences, Chişinău, 2013; the International Scientific Conference: University education and labour market: connections and perspectives, State University of Moldova, Chişinău, 2014; the International Scientific Conference: Higher Education: meaning and educational opportunities for research and innovation transfer, Chisinau, 2016; Didactica pro, magazine of educational theory and practice, Chişinău, Dec, 2013, 2015; Moldova State university magazine, Chişinău, October 2014; Official Site of Carmel College-Israel, August 2015.

Summary of the thesis parts

The content of the thesis includes annotations in Romanian, Russian and English, three chapters, conclusions and bibliography of 204 titles and 7 appendices. The thesis base contains 156 text pages.

The introduction discusses the actuality and importance of the research topic, research goal and objectives, scientific novelty and originality of the research, theoretical significance and practical value of the research, scientific approval of the results, summary of the thesis parts and the main research findings.

The first chapter entitled "Theoretical background of Environmental Education, approaches in Environmental Education and Environmental Literacy" includes in its first part, the development of EE in the world and in Israel, world events, definition, conceptualization and Framework of EE. The second part of this chapter focuses on different approaches in EE, and on the importance of clarifying environmental perceptions. The third part of the chapter includes definitions of the term EL, the process of forming a framework of EL, the development of EL components, and a review of the researches that were conducted around the world and aimed to evaluate EL or some of its components.

The second chapter entitled "Environmental Education in Israel as part of a national strategy and the Arab society in this context" focuses, in its first part, on the development of EE in Israel and its integration in the education system. It also focuses on the researches that examined the impact of EE programs on students, and the importance of teachers training courses. The second part focuses on the leading EE programs running across the country, the elements of effective EE programs and the evaluation of EE programs. The third part focuses on the relation between the Arab society and the environment, the presence of environmental aspects in their lifestyle and religion, the reasons for considering the Arab society as a community of law EL and the problems that the Arab society faces while dealing with EE.

The third chapter entitled "Experimental validation of the effectiveness of the methodology: Environmental Literacy of students and perceptions of students and teachers" presents, in its first part, the research design and an explanation about the intervention program. The second part presents the findings of the quantitative analysis that include the students' EL level, the connection between EL and background variables and correlation between EL components. The third part presents the findings of the qualitative

analysis that include the students' and the teachers' environmental perceptions. The last part of the chapter is mainly a discussion round the research findings.

The main research findings show that:

- The general level of EL of all students in all types of schools is inadequate.

- The EL level in green schools is higher than the EL level in non-green schools.

- The EL level has increased, during the school year, in all types of schools.

- A moderate correlation was found between some EL components but in general no significant correlation was found between El components.

- Diverse sources of environmental knowledge have contributed more to the raising of the students' El level, but no significant effect of the other background variables was found.

- The EL level has increased significantly in the school with the intervention program.

- The intervention program has positively affected the environmental perceptions and perceptions concerning the environmental programs of the students and the teachers as well. Students and teachers referred more to the sustainability approach.

Conclusions and recommendations: Conclusions based on research findings describe: the students' EL level in all schools in general and in each school in particular; correlations between the EL components; connection between the students' background variables and their EL level; and a reference to indicators of the students' and the teachers' environmental perceptions. In light of this, recommendations are summarized in four levels (decision makers' level, schools' level, teachers' level and students' level) and aim to enhance the status of EE in primary schools, to ensure the success of the EE programs and to raise the students' EL level.

1. THEORETICAL BACKGROUND OF ENVIRONMENTAL EDUCATION, APPROACHES IN ENVIRONMENTAL EDUCATION AND ENVIRONMENTAL LITERACY

1.1. Environmental Education: Development, Definition and Framework

Development of Environmental Education (EE) **-** This part includes summary of the development of EE in the world and Israel in order to display and explain the concept Environmental literacy (EL) which is considered as the ultimate goal of the EE. The two main movements that affected and contributed to the development of EE in the professional literature were educational and environmental movements. The initial educational movements that affected the development of EE were nature study movement (started in 1891), outdoor education movement (started in 1920) and conservation education movement (started in 1930s). At the same time initial environmental movements that promoted the field of EE were the preservation movement (1872-1908), the conservation movement (1908-1962) and the environmental quality movement (1962-1992), each one of these movements is based on different philosophy [77]. Nature study appeared in 1891 with Willbur Jackman's Nature Study for the common schools which defined the nature study movement [84; 97] and initiated a nature study movement taking students outdoor to study an indivisible environment [26]. The nature study movement was based on direct and immediate observation and experiments out of doors that would create an understanding and regard to the natural environment and make a student become more concerned about his environment [149]. After that, during 1920s, L.B. Sharpe and Julian Smith, who believed in the importance of taking the education methods out of door, initiated outdoor education movement [154]. Sharpe believed that outside is an experimenter that helped the student provide direct experience with the natural environment [26]. Several factors, that influenced the achievement and that the classroom isolated, were revealed by the education methods used to execute the nature study and outdoor education. For instance, first-hand experience in the natural environment through field can increase students' realization and understanding of nature and natural processes. A further ahead, in 1948, the International Union for the Conservation of Nature and Natural Resources (IUCN) activated the development of EE process. In the middle of the 1960s, the conception, EE, was revealed as a significant field in the literature [121]. The term, EE, was used for the first time in 1968 in New Jersey in National Conference in EE. Clay Schoenfield who was the editor of the Journal Environmental Education was one of the early users of the term EE [154]. Many attempts to define the term, EE, started in those years. In 1987, sustainability movement

was started in order to give more importance to environmental concerns with attention to social concerns [77].

World Events in the History of EE **-** In 1970, The World Conservation Union formalized for the first time, the term EE at the meeting held in Nevada, USA [60]. Later on, this term started to be discussed in the international area. In the United Nations (UN) Conference on the Human Environment, held in Stockholm in 1972, the issue of the world environmental degeneration was expressed for the first time. In this conference the foundations of environmental action were put at an environmental level for the first time [177] and called also for the provision of EE to deal with the world environmental issues [84]. This conference confirms the importance and necessity of establishing the International Environmental Education Programme (IEEP), which includes multiple disciplines in nature, inside and outside the school, and also includes lifelong education [177]. After that, several other international conferences were held and many reports, charters and recommendations were published. The establishment of the International Environmental Education Programme (IEEP) in 1975 was considered as a collaborative activity between United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations Environmental Programme (UNEP) [127]. Between 1975-1983, three main tendencies appeared in the activities of IEEP, called as three phases. In the first phase, between 1975-77, more importance was given to the development of global EE awareness. During this period, the most important events were The Belgrad Workshop in 1975 and the Tbilisi Intergovernmental Conference 1977. In these events goals, objectives and guiding principles were identified. In the second phase, during 1978-1980, many researches concerning different aspects of EE, were implemented in order to merge an environmental dimension into the general educational acts. In 1980, by the help of IEEP, an international conference of EE at primary and secondary levels was held in Budapest, Hungary. In the third phase, during (1981-1983), more attention was dedicated to the EE practices and training activities through developing new methods, materials and contents. Several studies and projects were implemented in order to integrate the environmental dimension into educational practices. During this period, the governments decided to improve their environmental programs in order to integrate EE into their own educational policy and plans in an effectively form. In 1987, an intergovernmental Congress on EE and Training was held in Moscow. This was organized by UNESCO in cooperation with UNEP [171]. The congress focused on the needs and priorities for developing EE and training, and provided an international plan for EE and training for 1990s [174]. This was a plan for the nations to prepare their own action plans for EE and training for 1990s. Later on, in the same year, the World

Commission on Environment and Development (WCED) published a report called "Our Common Future" or " The Bruntland Report", for re-considering the serious environment and development problems on the planet. The suggestions stated in this report were within the principle of Environmentally Sustainable Development (ESD) [14].

Following up in 1991, The IUCN,UNEP and WWF (World wide fund for nature) cooperatively published "Caring for the earth: A strategy for sustainable living" [62]. The publication focused on the importance of EE for SD and it was mainly based on conservation and development. Following up, several discussions, concerning Environment and SD, such as World Conservation Strategy in 1980, Our Common Future in 1987 and Caring for the Earth: A Strategy for Sustainable Living in 1994, and declarations, such as The Tallories Declaration in 1990, The Halifax Declaration in 1991, The Tokyo Declaration in 1993, and Swansea Declaration in 1993.

In 1992, United Nations (UN) organized a conference called "The Earth Summit", in Rio de Janeiro, Brazil. In this conference five main documents were signed by the participants which were (1) The Rio Declaration (a declaration of principles); (2) Agenda 21 (includes programs for actions and activities that aim to address the difficult issues of environmental protections and fair development for all, and includes the creation of a new Commission for Sustainable Development); (3) A Framework Convention on Climate Change; (4) A Framework Convention on Biological Diversity; and (5) Statement of principles on forests [178]. In Agenda 21, an extensive emphasis was put on action dedicated toward establishing Education for Sustainability (EFS). As mentioned in chapter 36, in Agenda 21, Education is very essential for obtaining environmental and immoral awareness, values and attitudes, skills and behavior match with SD and for effective public participation in decision making. In order to change peoples' attitudes so that they can assess and address their concerns on SD, both formal and non-formal educations are necessary [178].

Since 1992, UNESCO focused on education for SD, raising awareness and promoting more investments in education.

In 1990s, several UN conferences emphasized the importance of education for SD such as those on environment and development in Rio, 1992; human rights in Vienna, 1993; population and development in Cairo, 1994; small island developing states in Barbados, 1994; social development in Copenhagen, 1995; women in Beijing, 1995; food security in Rome, 1996; and human settlement-habitat in Istanbul, 1996 [168; 170]. These conferences boosted and enhanced the concept of education and public awareness and the understanding of "education for sustainability" (EFS).

In 1997, UNESCO organized a conference in Thessaloniki, Greece to the purification of the concept and message of education for SD [67]. The main purpose of this conference was to re-orientate the education of the SD. About six hundred people participated in this conference representing the UN system, governments, experts and other interested parties. In this conference it was stated that the re-orientation of education towards sustainability is the responsibility of all countries. The concept of sustainability includes not only environment but Also poverty, population, health, food security, democracy, human rights and peace. Sustainability is a moral obligation in which cultural diversity and traditional knowledge need to be respected [167].

In 2002, ten years after Rio Declaration, United Nations organized a conference, in Johannesburg, South Africa, called The World Summit for SD (WSSD) which also called as Johannesburg Summit [127]. Five major Fields were discussed in this conference; (1) water and sanitation, (2) energy, (3) health and environment, (4) agriculture and (5) biodiversity and ecosystem management, which was called as "WEHAB" [34].

As a result of the growing concern on education for SD the United Nations General Assembly announced, in 2002, the period 2005-2014 as the decade of Education for SD [176]. The Dedication of a decade assures that education is an important and essential way of realizing the SD.

The 2030 Agenda for Sustainable Development, are an intergovernmental set of aspiration goals with 169 targets. These goals and targets were intended to replace the goals that were set in the Millennium Summit when they expire at the end of 2015. The objectives were discussed for the first time in the UN Conference on SD in Rio de Janeiro in June 2012. On 19 July 2014, the UN General Assembly's Open Working Group on Sustainable Development Goals (SDGs) forwarded a proposal for the SDGs to the Assembly. The proposal contained 17 goals with 169 targets covering a broad range of sustainable development issues. These included ending poverty and hunger, improving health and education, making cities more sustainable, combating climate change, and protecting oceans and forests. On 5 December 2014, the UN General Assembly accepted the Secretary-General's Synthesis Report. The Intergovernmental Negotiations on the Post 2015 Development Agenda began in January 2015 and ended in August 2015. Following the negotiations, a final document was adopted at the UN Sustainable Development Summit September 25–27, 2015 in New York, USA. The title of the agenda is Transforming our world: the 2030 Agenda for Sustainable Development [179].

Definition and Framework of (EE) - There is no unified definition of EE in the literature because of the comprehensive nature of EE [129]. According to the development of EE, the educational movements that formed a base for developing the EE were nature study, conservation

education and outdoor education. In 1969 Stapp et al. stated that the aim of EE is to create people with knowledge concerning to bio-physical environment and its problems and have the motivation to work toward their solution [148]. Stapp and his colleagues believed that the major objects of EE are to encourage the people to acquire: (1) the understanding that man is part of a system and that he has the ability to change the interrelationship of this system, (2) the understanding of the biophysical environmental and its role in contemporary society, (3) the understanding of the biophysical environmental problems confronting man and how can these problems be solved and (4) the attitudes of concern for quality of the biophysical environment which will motivate citizens to solve problems concerning biophysical environment.

According to Stapp and his colleagues man cannot be separated from the natural surroundings and environment. The problems in the environment are caused by the functions of human kind that directly influence themselves. People should be aware of their influences, and commitments toward the natural environment and should take necessary actions in order to maintain the biophysical environment.

In 1970, Roth revised and modified the definition of Stapp and his colleagues and four main areas of concern were observed in his definition: biophysical, socio-cultural, environmental management and change. In the same year Schoenfeld realized that EE is more than conservation education, it is concerned with the relationship between man and his surroundings as a whole and puts more emphasize on the study of man.

Later, in 1974, Rillo mentioned about the objective of EE as the growing individuals who are motivated to use the environment and natural resources rationally to get highest quality of life for all [117]. He believed that individuals should understand the biophysical world. He included the biological, social, economic, cultural, ethical and aesthetic components of environment into the EE content. It is observed in his definition that man cannot be separated from the natural environment. In the same year, Tanner asserted that the focus of EE should be on Spaceship Earth concept and should deal with man-man, man-society and man-earth relationship.

In 1972, the International Union for the Conversation and Nature and Natural Resources defined EE as the process of acquiring values and explaining concepts in order to develop skills and attitudes necessary to understand and appreciate the relationship between man, his culture and his biophysical surroundings [61].

In 1975, the International Workshop on Environmental Education, held in Belgard, produced a tentative framework for EE. Within this tentative framework the objectives of the EE were stated [172].

According to the charter produced in Belgrad Workshop, the general goal of EE was to develop people that are aware of, concerned about, the environment and its associated problems, and which has knowledge, skills, attitudes, motivations and commitment to work individually, and collectively toward solutions of current problems and prevention of new ones [172]. The objectives of EE in this Framework were based upon awareness, knowledge, attitudes, skills, evaluation ability and participation.

In 1977, in the first Intergovernmental Conference on EE held in Tbilisi in Georgia, the concept EE was detailed more precisely. The participants of the conference identified the aims, goals and objectives of EE. The basic aim of EE as stated in the conference was to succeed in making individuals and communalities understand the complex nature of the natural and built environments resulting from the interaction of their biological, physical, social, economic and cultural aspects, and acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and the management of quality of the environment [169, P.25].

The main goal of the EE as stated in the conference were: (1) to increase awareness and interest in economic, social, political and ecological matters in the urban and rural areas; (2) to give people the opportunities to acquire the knowledge, values, attitudes, commitment and skills in order to protect the environment; and (3) to help individuals, groups and society as a whole to behave differently towards the environment [169].

The objectives of EE were according to the definition of Stapp et al. and according to the objectives identified in Belgrad 1975. The categories of the objectives were Awareness, Knowledge, Attitudes, Skills and Participation [169].

The participants of Tbilisi Conference Also identified several guiding principles that were proven and validated in further years by Hungerford at al. [56] and Hart [50]. In these principles, EE was considered "interdisciplinary subject" and "an approach to education as a whole, rather than a subject". So, EE can be used to improve all subjects in the curriculum [38].

Hungerford et al. [56] stated that the main goal of EE is to help citizens to acquire environmental knowledge and skills and the willingness to work, individually and collectively, toward achieving and maintaining balance between quality of life and quality of the environment.

The definition of EE done by Stapp et al. the Belgrade Charter and Tbilisi Declaration were the early attempts to develop the area EE. Recent definitions of EE are all based upon these initial attempts.

In 2001, the North American Association for Environmental Education (NAAEE) defined EE as a comprehensive process that develop an environmentally literate people and that help people understand the environment and the issues related to it [96].

In 1998, the Environmental Protection Agency (EPA) defined the EE as the interdisciplinary process of developing citizens with knowledge about the total environment, its nature and built, and has the capacity and commitment to ensure environment quality by participating and action [36].

In 1991, UNESCO-UNEP declared that EE is important for preparing literate students who will play active rolls for protecting the environment and taking environmentally friendly behavior [173].

The National Environmental Education Advisory Council of U.S. EPA recently defined EE as a composite process of developing people with knowledge about the total environment, its nature and built components and have the capacity and commitment to ensure environmental quality by participating in solving problems, making decisions and action [36].

In 1998, according to the document published after the Tbilisi Conference, Palmer stated that EE: is a lifelong process; a composite and inclusive in nature and implementation; is a path for the whole education and not just a subject; cares about the relationship between human and natural system; sees the environment as a whole that includes social, political, economics, technological, moral, aesthetic and spiritual areas; recognizes that energy and material sources present and limit possibility; urges participation in the learning experiences; assures active responsibility; includes several learning and teaching techniques and encourages practical activities and first hand experiences; is involved with local and global dimensions and dimensions involving all times; should be supported by the organization and structure of the learning situation and institution as a whole; aims to develop sensitivity, awareness, understanding, critical thinking, and problem solving skills; aims to develop and inculcate values concerning the environment; and is involved with buildings and environment ethic [109].

According to Hsu, EE helps the individuals develop awareness of, knowledge and attitudes toward the natural environment, acquire skills and motivation to act actively and resolve environmental problems and issues, and develop active involvement in preventing environmental problems and protecting and improving environment [53]. The fundamental aim of EE is to develop environmentally literate people who have responsible environmental behaviors [57; 58].

In summary, The main aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments. Further, to acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving social problems, and in the management of the quality of the environment.

1.2. Approaches to Environmental Education and Environmental Perceptions

Different Approaches in EE - According to the literature there are different conceptions about EE and about how to implement it, and in all there is a concern for the environment and a recognition that education has a major role in tending the environment.

In 2005, Sauvé unified similar conceptions, using different terminology, and then she identified different approaches, which are not necessarily different in all their attributes and their methods of operation. Her aim was to help formulate a worldview in EE, that appropriates to the characteristics and goals of the educator, the school or the organization. The recognition of the different approaches does not necessarily require the adoption of only one of them or rejecting the others. The comparison between the approaches enables the use of consistent terminology and avoids the adoption of contradictory approaches [128].

The environmental approaches are divided into two groups. The first group includes "old" approaches, and the other group includes "young" approaches that appeared in recent decades. The young approaches were developed from old approaches in light of the changes of the political, social, educational and environmental reality.

Despite the chronological development, this does not mean that we must adopt new approach. Each approach must be examined in the light of a general world view which is formed in a certain place, and is based on the belief in a certain pedagogical way [139].

The approaches displayed below (table 1.1.) help understanding that EE is a complex of languages , attitudes, and beliefs. Naturally, in the education system, the old approaches are found more, mainly because most of the teachers in the environmental organizations feel more comfortable in their implementation. However, programs that focus on EFS and programs that highlight the activism as a central value are increasing in the education system [139].

Table 1.1 - Approaches to Environmental Education identified by Sauvé (2005)

Old Approaches in EE	Young Approaches in EE
Naturalistic (natural) Approach	Holistic Approach
Conservationist/Resourcist Approach	Bioregionalist Approach
Problem Solving Approach	Praxic Approach
Systematic Approach	Socially Critical Approach
Scientific Approach	Feminist Approach
Humanist Approach	Ethnographic Approach
Value-Centered Approach	Eco-Education Approach
	Sustainable development/Sustainability Approach

From the condensed examination, of the different approaches in the EE, it is clear that there are points of closeness between the different approaches, in the theoretical and the pedagogical level. Below (table 1.2.), mapping of the fifteen approaches, is presented in a condensed way, according to the following: the conception of environment, aims of EE, pedagogical highlights and examples of strategies. This proposed map, is useful in that it highlights the diversity or range of variation in pedagogical propositions in EE and thereby contributes to "celebrating" the richness of this field. It may be considered as a tool that provides sources for planning adequate educational strategies, according to the intended objectives and context of intervention. It may also be useful for teachers' and other educators' professional development in EE. It offers avenues for more profound exploration and a critical analysis of each strand of thought and practice and it allows for each one to be contrasted with the others. This typology may also assist educators to situate their own theoretical choices and their own practices on a map of the EE landscape, to analyze and enrich them if and where appropriate.

Finally, it should be recalled that this map (table 1.2) is only an attempt to understand a reality. The landscape of environmental education is far richer than this mapping can convey and thus it will remain an unfinished project that its development will follow the moving and the branched pathway of EE itself.

Table 1.2 - Characterization of Fifteen Approaches in Environmental Education

Approach	Conception of Environment	Aims of Environmental Education	Pedagogical Highlights	Examples of Strategies
Naturalist / (Biocentric)	Nature	Reconstruct a link with nature.	Sensorial, Cognitive, Affective, Experiential, Creative/Aesthetic	Immersion; interpretation; Sensorial games; Discovery activities.
Conservationist/ Resourcist	Resource	Adopt behaviors compatible with conservation. Develop skills related to environmental management.	Cognitive, Pragmatic	Guide or code of behaviors; set of activities; Environmental audit; Conservation project.
Problem-solving	Problem	Develop problem-solving skills: from diagnosis to action.	Cognitive, Pragmatic	Case study: issue analysis; Problem solving project.
Systemic	System	Develop systemic thinking: analysis and synthesis, toward a global vision. Understand environmental realities in view of enlightened decision-making.	Cognitive	Case study: environmental system analysis; Construction of ecosystem models.
Scientific / (Anthropo-centric)	Object of study	Acquire knowledge in environmental sciences. Develop skills related to the scientific method.	Cognitive, Experiential	Study of phenomena; Observation; Demonstration; Experimentation: Hypothetico-deductive research activity.
Humanistic/ Mesological	Living Milieu	Know and appreciate one's milieu of life; better to know oneself in relation to this living milieu. Develop a sense of belonging.	Sensorial, Affective, Cognitive, Experiential, Creative/Aesthetic	Itinerary; Landscape reading; Study of milieu; investigation.
Value-centered	Field of values	Adopt ecocivic behaviors. Develop a system of ethics.	Cognitive, Affective, Moral	Analysis of values; Clarification of values; Criticism of social

				values.
Holistic	*Holos*, *Gaïa*, All, The Being	Develop the many dimensions of one's being in interaction with all aspects of the environment. Develop an "organic" understanding of the world and participatory action in and with the environment.	Holistic, Organic, Intuitive, Creative	Free exploration; visualization; Creative workshops; Integration of complementary strategies.

Table 1.2 - Characterization of Fifteen Approaches in Environmental Education (continue)

Approach	Conception of Environment	Aims of Environmental Education	Pedagogical Highlights	Examples of Strategies
Bioregionalist	Place of belonging, Community project	Develop competencies in/for local or regional community ecodevelopment.	Cognitive, Affective, Experiential, Pragmatic, Creative	Exploration of our shared milieu; Community project; Project of local or regional ecodevelopment.
Praxic	Locus of action /reflection	Learn in, by, and for environmental action. Develop reflexive skills.	Praxic	Action-research; Reflexive posture in activities or project.
Socially Critical	Object of transformation, Place	Deconstruct socio-environmental realities in view of transforming them and transforming people in this process.	Praxic, Reflexive, Dialogic	Analysis of discourses; Case study, Debate, Action-research.
Feminist	Object of solicitude	Integrate feminist values into the human-environment relationship.	Intuitive, Affective, Symbolic, Spiritual, Creative/Aesthetic	Case study, Immersion, Creative workshop, Communication & exchange activity.
Ethnographic	Territory, Place of identity, Nature /culture	Recognize the close link between nature and culture. Clarify one's own cosmology. Valorize the cultural dimension of one's relationship with the environment.	Experiential, intuitive, Affective, Symbolic, Spiritual, Creative / Aesthetic	Fables, Stories and legends; Case study; Immersion; Modelling; Mentoring.
Eco-Education	Role of interaction for personal development, Locus of identity construction	Experience the environment to experience oneself and to develop in and through it. Construct one's relationship with the "other than-human world".	Experiential, Sensorial, Intuitive, Affective, Symbolic, Creative	Life story; Immersion; Exploration; Games; Introspection; Sensitive listening; Subjective/objective *alternance*.
Sustainable Development/ Sustainability	Resource for economic development, Shared resource for sustainable living	Promote economic development that takes care of social equity and ecological sustainability; Contribute to such development.	Pragmatic, Cognitive	Case study; Social marketing; Sustainable consumption activities; Sustainable living management project.

Environmental Education and Education for Sustainable Development (ESD) / Education for Sustainability (EFS) within the learning processes - The sustainability education approach, is discussed extensively in the literature over the last decade. The writers disagree as to whether it is another current in the EE or it is completely different paradigm of EE. Also it is noteworthy in this context that there is a debate in the literature between the concept "Education for SD" and the concept of "EFS". Researchers that can distinguish between the two concepts, claim that the learning process in education for SD focuses on the skills required for sustainable economic development, whereas the

learning process in EFS focuses on the skills required for sustainable lifestyle [71]. Although this current was first defined in the 1980s, but the basics for EFS were placed a decade before. As mentioned before, the idea of SD is in the center of this approach.

In Brundtland report, where this concept was first discussed, it was written that humanity is able to make development sustainable by ensuring the fulfillment of the needs of the present without endangering the ability of future generations to provide their needs. Eventually, development that can be maintained is not a permanent condition of harmony but rather a process of change in which the exploitation of resources, directing investments, directing technological development and institutional changes, match with the needs of present and future together [183]. In the first international conference for EE that was held in Tbilisi in 1977, settings were formulated and designed to assist in developing EE programs. These settings bind inside them the need to look in a multidimensional way, that includes the various aspects of the society and its needs: "While the biological and physical components are the ones building the natural environment of man, the moral, social, cultural and economic aspects play an important role in the way a person perceives and understands the possibility to make intelligent use of available resources in order to serve his needs" [169]. Although there is an agreement about the importance of achieving the "EFS" goals, there is no consensus yet regarding its practical significance. Similar to the concept "SD", the domain "Education for Sustainability" is a subject for interpretations as these and others regarding how it should be integrated into the society in order to achieve its goals.

The different approaches in EE, are also based on the characterization of the interaction between man and his natural environment: some of the approaches, such as the naturalistic approach are more suitable to the biocentrism eco-centrism perception of human-environment relations - which sees in the natural environment a value of itself, regardless of the human and his needs. In contrast, the humanist or ethnographic approaches are suitable to ethnocentrism, that is, they consider the natural environment as a source that allows the existence of a human [164]. From the other hand, there is another reference in how to use the environment in the learning process. Many, often quote that EE is "about the environment", "in the environment" and "for the environment" [76]. The natural environment is used both as an arena for learning (Education in Nature) , as a source of concern and action (Education for Nature) and as an object of learning (Education about Nature). The concept of "Education for the Environment", despite its central role in EE in the recent decades, is often perceived as indoctrination that is opposed to the perception that the learning process is an individual development of values for independent thinking. G'ikling and Spork [63] claim that when it comes to

"Education for the Environment" the intention is actually to education that is done for other purpose, outside the array of the education itself. According to them, if the essence of education is to develop critical thinking, explore concepts and acquire skills to make decisions in order to function as citizens in a critical and growing society, we must consider the possibility that these that we wish to educate may reject the same external purpose we are targeting. That is, if we want to develop environmentally friendly behaviors, we should not preach such behavior patterns and hope that they appear as a result of the learning process.

The different approaches of EE relate mostly to learning processes, the learner's status in the process and how meaningful learning occurs in the process. The ambiguity and lack of consensus regarding how to deal with EE, as well as in relation to the perception of learning and learners, lead to the conclusion that dealing with EE, whether it is the study of teaching and learning or curriculum development, is better to be done out of recognizing and understanding of the various theories dealing with learning processes [25]. In 1997, Russell examined, in his article, EE in terms of how the learning process is perceived. The article describes different ways of transition and acquiring knowledge that refer to different approaches: Transmission; Transaction; and Transformation [124].

Environmental Perceptions for the Development of Environmental Literacy - In recent years there has been an increase in the government's commitment to expand EE in the educational system, which is reflected, among other things, in the increasing number of schools that incorporate this theme in the school curriculum [181] and the increasing number of educational institutions that were accredited as green educational institutions [199]. The growth of EE in the educational system raises the need for qualified teachers who are able to lead EE as an integrative theme. Teachers must understand that the environment is a dynamic system of relationships between biotic and abiotic components, and that the man and his systems are an integral part of them. Also, in order to be able to promote EE, teachers are required to understand that environmental issues are not just bio-physical, but they incorporate social, economic and political aspects. Therefore, on one hand, understanding the environmental perceptions of teachers is very important and necessary in evaluating the effectiveness of environmental programs at schools. On the other hand, according to Dafna and her colleagues [46], understanding the environment helps characterizing the EL: for example, a partial understanding of the term "environment" is consistent with the low level of environmental knowledge. Also, there is a correlation between the perception of the environment as an object that man is not part of it, and therefore a person does not see himself responsible for it, and the insufficient involvement of the students in responsible environmental behavior. Therefore, understanding of environmental

perceptions of the students is also very important and necessary in evaluating the effectiveness of environmental programs in schools. It is very important to clarify perceptions of those involved in EE from several assumptions: the ways in which people experience the environment and understand it, affect their environmental behavior and thus it is very important to decipher these understandings [75]. EE is an education for social and environmental change and it directs to behavioral change that leads to environmentally responsible behavior, so the EE should be based on the ways in which different people perceive and understand their environment and define their place in it [182]. Analysis of perceptions of those involved in EE may contribute to the development of programs and effective teaching methods in EE, which expand understandings, since perceptions reflect and clarify their understandings concerning the environment, their environmental worldview and their attitude toward environmental issues [75; 111; 119]. Perceptions of teachers are very important because they are the key to the implementation of significant EE in the educational system and to the development of EL among students [86]. In addition to knowledge, the teachers must provide students with the ability to understand, criticize and discuss equivalently the environmental issues that are loaded with science and values and require a comprehensive reference that includes ethical considerations, and social and cultural values. If the teachers lack knowledge, skills, attitude and commitment to the environment, it is unlikely that they can be used as leaders of environmental change in schools [101]. Empirical evidences show that insufficient EE in teacher training is one of the obstacles of the successful implementation of the EE in schools [21; 66; 85; 86; 167]. Identifying ideas and understandings concerning the meaning of the environment, as well as decoding eco-philosophic perceptions, add a facet that cannot be revealed in a quantitative investigation of the EL variables (knowledge, attitudes and behavior). Thus, it contributes to the building of a comprehensive and accurate picture of the EL of students, which will lead to significant integration of EE in teacher training programs. Different people refer to the environment from different observation angles that are affected from cultural and social norms and values, from social class and from geographical location [47; 131]. Looking at environment is varied. It can be narrow or broad, and it may include looking at environmental problems, the causes of these problems, solutions and human involvement in creating the problems and attempts to solve them. One of the concepts studied in this context is "Ecological Concern" which means a combination of caring for the environment and views about environmental issues [130]. Different researchers have raised the question what are the values according to which people refer to the environment and what are the values that drive people to change their behavior towards the environment? Stern and Dietz [150; 24], were based on the altruistic model of Schwartz [133] and claimed that there are three moral approaches according to which people act in relation to the

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environment: Biospheric approach, altruistic-social approach and egoistic approach. People who act according to the Biospheric approach examine environmental issues on the basis of benefit or loss to ecosystems, people who act according to the egocentric approach examine environmental issues in accordance to the benefit or loss in relation to themselves, their health, the future of their family or even their country, and people who act according to the altruistic approach consider environmental issues on the basis of benefit or loss of community, ethnic group, or the whole humanity. The biospheric approach is parallel to the biocentric approach and the egocentric approach is parallel to the anthropocentric approach. Wals studied students' perspectives regarding environmental issues and identified three forms of thinking: personal, technocratic and political/civil approach [182]. According to the personal approach environmental problems are physical in their nature, they are caused directly by a specific human behavior and are also subject to personal review. The technocratic approach is broader. According to it the environmental problems are an inevitable product of modern and industrial lifestyle. The civil approach is the most comprehensive. According to it the environmental problems are global and represent contrasting interests, diverse choice possibilities and different values. Solutions can be obtained only through a change in lifestyle. Similarly, Ballantyne [2] found three environmental perspectives among teachers' answers to the question: "Why do you feel that protecting the environment is important?" egoistic, conservative (guardianship) and ecocentric. The egoistic perspective is parallel to the anthropocentric approach. The conservative approach is similar to the altruistic approach or the sustainability approach. The ecocentric perspective is similar to the biospheric approach. Most studies that have examined the environmental perceptions of learners focused on students in the educational system [75; 142; 141; 182]. Loughland and colleagues [75] identified six categories according to the definitions given by students in elementary and secondary schools concerning the concept "environment": the environment as a place; the environment as a place that contains living creatures; the environment as a place that contains living creatures and humans; the environment does something for human beings; humans are part of the environment and are responsible for it; humans and environment are in a reciprocal interactions system. The categories are hierarchical, from a limited understanding of the environment to an inclusive and comprehensive vision. The first three categories reflect the perception of the environment as an object while the last three reflect the perception of the environment as a totality of reciprocity between the environment components [75]. This distinction, has an implication on the tendency for environmental involvement, since individuals that perceive the environment as an object do not necessarily feel and understand the need for taking personal responsibility toward the environment. From the analysis of the illustrations and texts of middle school students, Sheperdson

and colleagues [141] identified four mental models through which students conceptualize environment: a place where animals and plants live - natural place; a place that supports life (animals, plants and humans); a place which was affected (pollution) or modified by human activity or intervention (built environment); a place where animals, plants and humans live. The findings indicate that students understand environment in a narrow ecological perspective [142], when the prevailing perception is the perception of the environment as a natural place without human [141]. Robertson [118; 119] found that students in teaching colleges perceive environment in four aspects; Social (focusing on social relationships and the effects of environmental issues on humans); Political (social justice awareness, economic inequality and non-representation of interests of the public in decision-making); Bio-physical (focusing on natural systems and human impact on them); Inclusive (interactions among the three aspects mentioned [118]. These aspects also appear in the model of O'Donoghue and Russo that describes the relationship between the dimensions: society, economy, politics and biophysical factors of environmental issues [106]. The discussion of eco-philosophic perceptions also deals with the environmental worldview of people in relation to various values-based aspects. Robertson showed that perceptions of students about human-nature interactions reflect eco-philosophic approaches and different values-based approaches. Some of these approaches deal with the perception of the relationship between man and living and non-living elements of environment/nature, which can be placed on a bi-polar axis, that one end reflects the perception that human is separate from the natural environment and the other reflects the perception that environment is a totality of relationships between human and other environmental components [119]. Another approach, deals with the value vested to the non-human natural environment. In this regard, Robertson identified through the students' perceptions, an utilitarian value and intrinsic value. The imparting of utilitarian value to the environment reflects anthropocentric worldview, according to which the person is in the center and only he has an intrinsic value. The nature with all its components is identified as a resource for the benefit of the human and thus its value is estimated according to the benefits it provides to human. This ethical approach takes place in the basis of the dominant paradigm that characterizes the Western society. Opposite to the anthropocentric approach, the ecocentric worldview sees that the man is one of the ecosystem components and not who stood above them. Therefrom, the other components of the system, have an intrinsic value that is independent of the benefits they provide to person. This approach is part of a new environmental paradigm [32; 33]. The anthropocentric-ecocentric distinction is used for characterizing the basic values in relation to the natural environment and for examining the changes that occur during the time and in the wake of the exposure to the environmental domain. Other based-values aspects are expressed in topics such as

protecting the environment. For example, the approach of nature preservation reflects a romantic conception of primordial nature as a pure and simple place that provides aesthetic and spiritual values and enriches the soul [73; 93]. However, the wise-use approach, reflects utilitarian anthropocentric conception that according to it protecting natural resources is required to enable them to continue to exist and to be used by human. The study of Dafna and her colleagues [46] revealed a number of categories that reflect the attitudes and the different aspects by which students understand the concept of "environment: Romantic Perception - identifies environment with pastoral nature, using terms associated with nature that provides humans aesthetic and spiritual values; Environment Quality Perception - according to this perception the environment is perceived in terms of the negative effects of human, with extensive use of the terms "infection and cleanliness"; Dualistic Perception of the environment (contrasting nature versus human impact) - the environment is perceived as a conflict between nature (identified as a good thing) and damage originating from human activity. The students' answers revealed also, dimensions described in the model of O'Donoghue and Russo [106]: the bio-physical dimension: all regions on earth including animals, fungi, bacteria, landscapes and seas, and the air that surrounds us; the social dimension: family, friends, people we know; Economic dimension: entering many nature reserves with payment, parking cost money; political dimension: political corruption (there is no reference to this matter in our country since the bodies governing the country do not see it important). According to the study, only few expressed a complex perception relating to the interactions between these dimensions: nature, animals, people, interaction between all factors and their impact on each other, the country that harms the environment, over-exploitation of resources, damage to unique ecosystems by the wealthy people. The Students' answers revealed also values-centered environmental perceptions. Categories that dealt with the perception of man's place in the environment (human-environment relation), were placed on an axis that reflects a sequence between the perception that man is not part of the environment, through a perception that man is part of the environment to the perception which recognizes the existence of a relationship between man and nature. Other categories that dealt with how man perceives the value of the natural environment, reflected a continuum between the anthropocentric and the ecocentric approach. Students' answers also have raised egocentric perspective - "I am in the center", whereby students place themselves as a reference value to the environment perception.

In summary, the literature presents different approaches in implementing environmental education, which in all there is a concern for the environment and a recognition that education has a major role in maintaining the environment. The EE approach affect perceptions of those involved in the process. Different people have different environmental perceptions. Identification of the

environmental perceptions may help improving the EE process and raising the EL level of the participants.

1.3. Environmental Literacy: Definition, Conceptualization and Framework

Definition, Conceptualizing and Framework of Environmental literacy (EL) - There is no exact definition of Environmental Literacy (EL) [28] although it is a subject of many research studies and many researchers and organizations have written about it. Many researches defined by explaining or implying that the main goal of EE is to develop an environmentally literate citizenry. There is consensus among researches that EL is an outcome of EE programs and initiatives [83; 94; 175] and a fundamental goal of EE [20].

Harvey [51], indicated that the expected outcome of EE is "developing environmental literate citizenry" or "EL". Later, Harvey added two more categories for expected outcomes. The levels of expected outcomes of EE are to develop environmentally literate person and environmentally competent person and environmentally dedicated person. Harvey defined environmentally literate person as "one who processes basic skills, understandings, and feelings for the man-environment relationship. Many more researches defined EL according to their research findings and their own context. Rockastlei [120] defined El as understanding of the interaction between humans and their natural environment which includes living things and non-living things.

Daudi [22] connects EL with the cognitive that in general refers to the ability to write and read about environment or environmental knowledge in a wide range. However Coppola [17] indicated that EL cannot be restricted by cognitive only. It should be defined in cognitive and conative terms.

Roth [121] believed that EL is the capacity to understand and explain the relative health of environmental systems and to act properly to maintain, restore or improve the health of those systems. Furthermore Roth cleared that EL includes four main terms - Knowledge, Skills, Affect and Behavior. Roth identified three levels of EL: (1) Nominal: when a person knows basic terms about environment and can define their meanings, (2) Functional: when a person knows and understands in a broader way, about the nature and interactions between human social systems and other natural systems, and (3) Operational: when a person can evaluate the effects and implications of actions, gather relevant information, capable to choose the best solution among alternatives, support action and act for sustainability and healthy environment [121]. Roth believed that EL demands understandings, skills, attitudes and habits of minds that would empower long-term action for sustainable future. He further claimed that EL must be defined in terms of environmental responsible behavior (ERB).

Goldman, Yavetz and Pe'er [44] identified environmentally literate person as "possessing the values, attitudes and skills that enable knowledge to be converted into action". Marcinkowski (1991) recognized that EL concerns; (a) awareness and sensitivity toward the environment, (b) an attitude of respect for the natural environment and of concern for the nature and magnitude of human impacts on it, (c) a knowledge and understanding of how natural system work, as well as of how social systems interface with natural systems, (d) an understanding of various environmentally-related problems and issues (local, regional national, international and global), (e) the skills required to analyze, synthesize, and evaluate information about environmental problems/issues using primary and secondary sources, and to evaluate a select problem/issue on the basis of evidence and personal values, (f) a sense of personal investment, responsibility for, motivation to work individually and collectively toward the resolution of environmental problems/issues, (g) a knowledge of strategies available for use in remediating environmental problems/issues, (h) the skills required to develop, implement and evaluate single strategies and composite plans for remediating environmental problems/issues, and (i) active involvement at all levels in working toward the resolution of environmental problems/issues [79].

The concept EL has many aspects. According to Ehrenfeld [35], hiding behind the definition of EL are models of world complexity, human psychology and cognitive behavior, human-environmental systems, sociology, environmental economics, and even industrial ecology [35].

The EL Assessment Consortium consisting of EE scholars designed El framework based upon historical definitions, research and evaluation literature, and learning outcomes in EE [187; 147]. The framework of EL includes: (1) Cognitive dimensions: knowledge of ecological and socio-political foundations, knowledge of environmental problems and issues, knowledge of environmental action strategies that aim to deal with these problems and ability to develop an evaluate action plan in order to resolute environmental problems and issues, (2) Affective dimensions: recognition of the existence of environmental problems and issues and the importance of the environmental quality, positive attitudes toward the environment and willingness to act for solving these problems or preventing them, (3) Additional determinants of environmentally responsible behavior: believing in the ability to positively influence the outcomes of the environmental problems and issues and acquiring personal responsibility to act in order to influence the environment, and (4) personal and group involvement in environmentally responsible behavior: eco-management, economic/consumer action, persuasion, political action and legal action. All of the above provides evidences that EL includes four main categories; (1) knowledge, (2) Affect, (3) Skill, and (4) Behavior [53]. Later, broader evolving lists of

EL components have been developed. Each of these framework assume that EL includes at least five groups of learning outcomes within several learning domains: cognitive, affective and psychomotor or conative.

In general, EE and more recent education for sustainability (EFS) (as mentioned previously) have been identified as means or tools for developing EL [127; 148; 121; 178].

Research on EL Assessment - Studies have been conducted around the world evaluating EL or some of its components [92; 72].

The existing literature points out that the research studies concerning EL assessment are all fundamental and important. These studies were classified into four categories: (1) studies assessing the effectiveness of EE programs for fostering EL or assessment of EL as an outcome of EE programs and initiatives [18; 122; 123]. (2) studies assessing EL or establish EL baseline of students or teachers [87; 158]. (3) studies determining the relationship between El components as predictors of responsible environmental behavior – REB [55]. (4) studies assessing EL in order to develop or test the validity, reliability and usability of an instrument for measuring EL [81; 90].

In the past twenty years several studies have been conducted in order to assess the EL level or some of its components of target groups at national level and in addition to these studies regional studies were conducted in many countries around the world.

In 1993, Benton tested 88 MBA students both before and after a 10-week environmental management course, using an environmental attitude and knowledge scale and he found that students were more environmentally knowledgeable, expressed greater concern about the environment, and were more action oriented after the course than before the course [9].

In 1997, Hsu conducted a research aimed to assess the EL level and to determine the effects of nine selected variables on participants' ERB, of 236 secondary school teachers in Taiwan. Hsu developed her own instrument. The findings revealed that knowledge of and skills in using environmental action, and intention to act were found to be three powerful predictors of ERB. She also found that using environmental action strategies, environmental responsibility and locus of control had the best impact on the intention to act [55]. The best predictors of ERB, for urban teachers, were; intention to act, skill, major source of information and membership in environmental organization but for rural teachers the best predictors of ERB were; perceived knowledge of environmental action strategies, intention to act and perceived knowledge of environmental problems and issues [54].

In 1999, Willis conducted a study research in order to assess EL of high school students [188]. The instrument used in this study was developed by the National EL Assessment Project (1994) and included knowledge, affective, skill and behavior components. The study revealed knowledge of ecological principles and environmental science, limited awareness of environmental problems, positive attitudes towards environment, moderate levels in using environmental action strategies, and limited participation in environmental responsible behavior.

In 2001, Donavan conducted a research aimed to evaluate twelfth-grade students' environmental knowledge, attitudes and behaviors while comparing between two groups of students to each other and to the nation's adults in Texas, United States of America. The results showed that although the students scored higher than the nation's adults, however the nation's adults had higher score on environmentally responsible activities. The results indicated also that these were positive relationships among environmental knowledge, attitudes and behavior [29].

American National EL assessment study [82; 78] was conducted with 1042 6th and 962 8th grade middle school students selected randomly from 51 countries across the U.S. The instrument used in this study was the Middle School Environmental Literacy Instrument (MSELI) developed by Bluhm, Hungerford, McBeth and Volk [12]. It included seven components of EL. The results indicated that the highest score were obtained in environmental knowledge, lower score in environmental affect and lowest score in cognitive skills and moderate level EL for both groups of students.

Another national EL assessment was conducted in Korea [16; 143] with 969 3rd grade, 987 7th grade and 1047 10th grade students. The instrument used in this study was the Environmental Literacy Instrument For Korean Students (ELIKS) based upon Simmons (1995). The findings revealed that a significant correlation between behavior environmental attitude and ERB but the correlation between behavior and knowledge was low. Knowledge was much related to skills. Female students in 3rd grade indicated higher environmental knowledge, skills, attitudes and ERB. It was found that variables such as gender, experience of EE program in schools, science achievement, and parent education background had an impact on improving students' EL but the effects decrease when students become older.

In 2007, O'Brien and colleagues conducted a study research in order to assess levels of environmental knowledge and attitudes of IOWA State University in U.S. under graduate and graduate students [105]. The instrument used in this study was developed specifically for the study in order to measure awareness, knowledge and attitudes towards environmental issues. The results of this study showed that students had moderate level of environmental knowledge related to the issues

mentioned in the study. Their demographic characteristics were found to be significantly correlated to their environmental knowledge was found to be correlated to their attitudes as well.

In 2008, Wright conducted a study in order to evaluate postsecondary students' EL [189]. The sample of this study included 183 post-secondary non-science students; (102) students in the experimental group (participated in a constructivist learning environment) and (81) students in the control group (participated in a traditional lecture based curriculum). Results of the Constructivist Learning Environmental Survey (CLES) [161], that was used to understand if the constructivist learning environment occurred in the classroom, showed that there were significant differences between the constructivist learning and traditional learning environments. On the other hand the Environmental Literacy Instrument used in the study showed that there were no significant differences between the constructivist learning and traditional learning environments before and after taking an introductory environmental science course which means they had similar improvement on their EL.

Wright [189] conducted a second study trying to assess post-secondary students' EL while comparing the effect of Web-based and In-Class methods. The sample of the study included 86 non-science major students at a local two-year community college. The Web-based group included 28 students which participated in an online course, and the In-Class group included 58 students which participated in traditional lecturer based classes. The EL components used in this study were; knowledge, Beliefs, Opinions, and self-perceptions. Results before and after attending the course, the In-Class group knowledge had higher scores than the Web-Based group.

In 2011, Erdogan and Ok, conducted a national wide survey in order to assess Turkish students' environmental literacy (EL) level by considering six EL components. The sample of the study comprised of 2,412 fifth graders selected from 78 primary schools (26 private and 52 public) in 26 provinces of Turkey. Data were obtained through the use of an elementary school environmental literacy instrument (ESELI) including five parts and total of 75 items. The results revealed that most of the students scored a moderate level of EL, quarter of the students scored a high level of EL and only few students showed low level EL [37].

In 2012, Teksoz, Sahin, & Tekkaya-Oztekin, conducted a study, on 1,345 university students, that aimed to propose an Environmental Literacy Components Model to explain how the components relate to each other. The findings showed that high levels of environmental knowledge stimulate the university student's concern, attitudes, and personal responsibility toward environmental protection. it had indirect relationships with environmental attitudes and responsibility. Moreover, while attitudes

toward the environment were found to be a significant determinant of environmental responsibility, environmental concern held significant association with attitudes toward the environment and outdoor activities. These findings help improving EFS in higher education curricula [162]. The positive attitude towards environment is very important component of EL. Many studies have proved this issue.

The research of Maulidya, Mudzakir & Sanjaya [80], on fast learning students in junior schools in Indonesia, who have a high average of intelligence, have shown that the level of knowledge and cognitive skills components of the students were high indeed but the level of affective and responsible behavior components were not satisfactory. The analysis of the results showed that the environmental behavior is affected from the environmental attitudes and not from the environmental knowledge.

Research on EL in Israel - In the past, In Israel, several studies have been conducted for the assessment of EL or some of its components. In 1982, by the order of the Ministry of Education, a study has been conducted by Abraham Bloom, for the evaluation of environmental knowledge and attitudes and he used the National Survey of environmental knowledge and attitudes that was developed in England amongst 11th grade students, with light revisions for the adaptation of the questionnaire for Israeli students. The sample of the study included 2029 students in 9th grade from 59 classes in 24 different schools. The purpose of the study was to assess knowledge and understanding concepts related to the environment, attitudes, sources of knowledge, the effect of background variables such as gender, residence size, education sector and different kinds of schools.

Bloom [10] found out that boys know more than girls in all subjects; through the questions relating to technology and energy a significance difference was found, and through questions relating to health, ecology and pollution no significant difference was found between the two groups. State schools scored higher grades than state religious schools. Demographic variables and academic achievement of students explained about 81% of the variance in the results. Knowledge sources out of school such as means of communication and self-reading were more significant factors than other factors: studying biology and other subjects, conversations with parents and friends or youth movements [10].

Goldman et al., [44] conducted EL assessment with 765 incoming students in three teacher training colleges in Israel. They developed their own instrument depending on previous studies. In the study they focused on behavior and background variables. Results of the study: participants who were aware of importance of ERB did not turn this awareness into action. Arab students showed significantly higher behaviors in the categories which reflect high level of environmental

commitment. Students whose mothers had high level of education showed significantly higher behavior related to recycling. Students who grew up in urban areas seemed to be less active in most of the ERB categories than students in rural areas did.

In 2006, Israeli National Environmental Literacy Assessment was conducted by Negev et al. [101] with 7635 6th and 12th grade students in 182 schools. The sample covered 5% of all schools in Israel. The instrument used in this research was based on three previous instruments. The Middle School Environmental Literacy Instrument (MSELI) developed by Bluhm, Hungerford, McBeth and Volk [12], The secondary School Environmental Literacy Instrument (SSELI) developed by Marcinkowski and colleagues and Teachers-College-student Instrument developed by Goldman et al. [44].

The survey included four sections: (1) Environmental background information and environmental behavior, (2) Awareness, attitudes and willingness to act, (3) Knowledge and its sources, and (4) Open-ended questions addressing to cognitive skills. Results of the study: 6th grade students had less environment knowledge but higher environmental attitudes and ERB than 12th grade students; significant correlation between knowledge and awareness and knowledge and attitudes but no significant correlation between knowledge and behavior; students who were more involved in nature scored higher in knowledge, attitudes and behavior dimensions; students who were more exposed to natural experiences scored higher in all dimensions; and background factors had certain influence on dimensions of EL.

In summary, the main goal of environmental education is an environmentally literate citizenry who can act successfully in daily life on a broad understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainably. Many researches have been conducted around the world to evaluate the EL level of particular groups at national and international levels but it is very clear that there is no updated or comprehensive report regarding the students' EL level in primary schools of the Arab students in Israel.

The research goal is: to analyze the theoretical framework of the EE programs impact on ecological literacy of students and the environmental perceptions of students and teachers and to develop the methodology integration of EE in the curriculum at the primary level in the Israel's Arab sector.

The research objectives are: to analyse the theoretical aspects of EE through extrapolate from the current EL of students in sixth grade in primary schools in the Arab sector, in general; to identify the EE methodological items by comparing the link between EL components (knowledge, attitudes,

behaviors and skills); to evaluate the impact of the contextual training factors (source of knowledge, sex, education level and occupation of parents, time spent outdoor) on EL of students in sixth grade; to develop an intervention program in order to prepare teachers to integrate EE into their study plan to improve the EL of students in sixth grade; to determin the impact of the intervention program on EL of students from the sixth grade and on environmental perceptions of teachers and students involved in the process.

The important scientific problem solved in the research was to analyze the theoretical and methodological aspects of the impact of the ecological literacy programs on the students from the sixth grade in the Arab sector from Israel and ecological perceptions of students and teachers about them in terms of harnessing the intervention program for teacher training in environmental education field in order to streamlining sustainable approach of the environmental behavior.

1.4. Conclusions to the first chapter

EE helps the individuals develop awareness of, knowledge and attitudes toward the natural environment, acquire skills and motivation to act actively and resolve environmental problems and issues, and develop active involvement in preventing environmental problems and protecting and improving environment. The fundamental aim of EE is to develop environmentally literate people who have responsible environmental behaviors.

There are different approaches to EE. EE approaches affect and are affected by environmental perceptions. Different people refer to the environment from different observation angles that are affected from cultural and social norms and values, from social class and from geographical location.

It is very important to clarify perceptions of those involved in EE from several assumptions: the ways in which people experience the environment and understand it, affect their environmental behavior and thus it is very important to decipher these understandings. Examining and analyzing perceptions contributes to the development of environmental programs and teaching methods. Perceptions are a key to realize EE in the educational system.

Environmental Literacy (EL) is an outcome of EE programs and initiatives and a fundamental goal of EE. Based upon historical definitions, research and evaluation literature, and learning outcomes in EE, the EL components are: knowledge, Attitudes, Affect, Behavior and skills.

In the past twenty years studies have been conducted around the world evaluating EL or some of its components. These studies were classified into four categories: studies assessing the effectiveness of EE programs for fostering EL or assessment of EL as an outcome of EE programs

and initiatives; studies assessing EL or establish EL baseline of students or teachers; studies determining the relationship between El components as predictors of responsible environmental behavior – REB; and studies assessing EL in order to develop or test the validity, reliability and usability of an instrument for measuring EL. Such studies have been conducted for target groups at national level and in addition to these studies regional studies were conducted in many countries around the world, but it was very clear that there is not an updated or a comprehensive report regarding the EL amongst Arab students in Israel.

In order to perform the current research, a literature review is needed about the situation of EE in Israel (particularly in the educational system) and the status of the Arab society in relation to this subject. Also, a literature review is needed about the leading EE programs running in Israel, effective EE programs and evaluation of EE programs. Therefore, the next chapter focuses on the environmental education in the educational system in Israel, the environmental programs and the Arab society in this context.

2. METHODOLOGY OF ENVIRONMENTAL EDUCATION IN ISRAEL – EDUCATIONAL PROGRAMS IN THE CONTEXT OF THE ARAB SOCIETY

2.1. Development and Prioritization of EE in the Educational System in Israel

The first conference for EE held in the country was in the year 1975. The main issues raised in this conference were about the integrating of the EE in the formal and non-formal system. The high school, for EE was established in Sdeh Boker in the beginning of the eighties of the last century. The Ministry of Environment was established In the nineties and it supported the building of educational programs. The Ministry of Environment entered the profession known as environmental sciences to high schools. The program included theoretical studies, a research and experimentation in nature [159].

Israel has participated in a research that examined the degree of interest and involvement of students in the age of 15 regarding issues related to the environment, together with 33 different countries, within ROSA project. Israel is considered as a country with a high level of development, but the students have shown a little of identification with statements expressing personal involvement and a greater degree with statements expressing collective involvement regarding issues related to the environment. That is to say, students believe that it is the responsibility of others to solve environmental problems and they are less willing to sacrifice their welfare even though they want a safe environment [165].

The EE in Israel is based on the government decision from May 14, 2003 regarding a strategic plan for SD in Israel. Following that, in January 2004, the Ministry of Education has published a CEO Circular which headline was "Implementation of Education for SD in the Educational System" [191], and it sets guidelines for the realization of above government decision. The comprehensive and detailed circular was written in cooperation with department of education in Ministry of Environment and it was stated in it, amongst other things that "the purpose of SD education is to develop awareness and respect for the environment amongst students in which they live and to ensure their commitment for SD on personal, national and planetary levels" and also that "the educational system is responsible for leading and guiding the global trend for SD".

As mentioned before and according to Zivit Linder [74], previous head of education and community department in the Ministry of Environmental Protection, EFS is different from EE. EFS is a moral and zionist education, that connect children to the environment they live in. Dealing with

environmental topics allows the real dealing with complex moral dilemmas and the development of critical and systematic thinking. She claims that the seriousness of the government and its commitment to this topic is expressed in the great budget allocated by the Ministry of Environmental Protection compared to the budgets allocated in previous years [74].

In June 4, 2007, another CEO Circular was published that dealt with education, with the headline of "EE – a key challenge in the educational system in Israel, an action plan for the promotion of EE". According to this circular, Primary and Junior High schools will stress the EE in a multi-disciplinary format during 2008 [190].

On the website of Ministry of Environment, the outline of EL education has been published for 3 age groups: Primary school, Junior High school and High school. For all age groups the basic concepts of the educational perception have been described and also practical indications have been proposed for teaching the subject [202]. Primary school teachers (and before them the pre-school educators) are facing the challenge of "enlistment of the natural interest, enthusiasm and curiosity that children have towards the living nature while gradual structuration of abstract concepts that exist outside of nature". Meaning that on the basis of the existing natural awareness of students concerning this subject, a knowledge of environmental processes has to be formed, that is supposed to lead to the creation of change of attitudes and norms of behavior and following that to active citizen responsibility. One of the most prominent characteristics of the EE study program is the desire to see a student and a graduate involved and active in environmental activity.

Different researches, have different opinions regarding how to implement EE in the education system. Hungerford and Volk [57] claim that in order to raise active students with environmental responsibility, an educational developmental sequence must be created that includes the instilling of basic ecological knowledge, that would allow the students understand the complexity of the environmental system, and following that an awareness of quality of life in the pupil's surroundings must be created while exposing him to the environmental dilemmas that would require investigation, evaluation, clarification of values and finally acceptance of responsibility and social activism.

Kashtenholz & Erdman [64] emphasize three components in this relation, in the world of school, relevant to this linkage: the pupil's attributes, a teacher operates through personal example and a structural teaching process that supplies learning opportunities and the imitation out of understanding of the individual and society needs.

Simmons [146] thinks that in order for environmental responsibility and awareness to evolve, that would then lead to social activism, a familiarity with and understanding of the environmental

system must be acquired with all its entailed dilemmas, and an ability of solving problems must be developed that would be supported by a feeling of high personal ability and a feeling of being able to make a change. Simmons claims that these aspects are vital for the molding of a pupil that will be willing to be committed for action for the environment and that the instilling of knowledge is not enough for this purpose.

Thomson & Hoffman [163] suggest integrating in the environmental studies an exposure and involvement of students in the residential community, dealing with consumption matters, involvement in the planning aspects of their place of residence and also encouragement for the participation in political events with environmental contexts.

In her early studies Ben Peretz [7; 8] deals with the difficulties entangled in the designing of environmentally involved pupil: low linkage between teaching contents and the daily life environmental reality, a low position of the environmental issue in the educational order of things, lack of educational "role model" at school, "conflicting values" between students and teachers, lack of sufficient proficiency of teachers in the environmental programs, trips and out of class activities that do not reach their goal due to social "distractions" and organizations and a difficulty to assess the learning process.

Studies that have been conducted for the purpose of examining the effect of EE on students, and through them on the environment, reveal that unique study programs in the field of environment are considered as relevantly effective compared to integrated study programs, in creating a change of behavior towards the environment (for example: [153; 114; 9; 65; 52]. A consistent introduction of positive attitudes towards the environment has also influenced pupil's behavior [104], mainly by teachers [108; 180].

The question of EE effect has been examined also in a study that examined the Maof project of the Jewish National Fund [6]. In a study that has encompassed about 800 students and educational staffs, a tool has been constructed that measures environmental awareness which included 3 components: (1) willingness to participate in Jewish National Fund activity for safeguarding the environment; (2) emotional involvement regarding environmental problems in Israel; (3) active interest in environmental issues in Israel and the world. Similarly to the above study, in this study there hasn't been any significant statistical raise found in the level of environmental awareness in its practical meaning as measured by this tool following educational intervention.

Environmental Studies in the Education System **-** The constant scientific innovation and the sheer scope of the knowledge gained in recent decades have brought profound change in perception

of the teaching of science in education systems in many countries, including Israel. In light of these facts more importance is attributed to acquire learning skills such as understanding articles and teamwork in order to understand and solve problems [49].

In primary schools, the subject that was called "nature" at the beginning of the educational system way, has been changed to "nature sciences" and after that to "science" in a frame called "Mabat" (science, technology and society). In parallel to this, the subject "technology" was developed, and its origin was the qualification subject "professionalism". A few years ago "technology" was combined with "Mabat". New learning programs were published for this combined subject, for the junior classes [11] and also for the primary school [191]. The environmental studies are included in the science and technology studies frame, and they contain multidisciplinary contents of the various science fields and they also contain economic, social, ethical and moral contents. In both programs, quarter of the defined goals relate to the influence of humans on the environment [11]. The evolution from nature to "Mabat" was not easy to realize in terms of preparing the needed human infrastructure. For example, teachers who teach science and technology "were not trained to teach with a focus on environmental sciences", and the Ministry of Education, that suffers from cuts in the recent decades, is having trouble finding the resources and programs that appropriate to upgrade teaching to a level that suits the standards and the tenure that it set to itself in the CEO Circular 1996 / B [11], in the standards document of 2004, and in the CEO Circular 2004 5\b "Implementing education for SD - in the education system." The purpose of the standards document [196] was to improve science-technology education in Israel and the CEO circular 5 \ b [191], was formulated according to the government decision No. 246 dated 14.5.03 concerning the Strategic Plan for SD in Israel [193].

Primary schools **-** In primary schools, grades 1 through 6, the environment is one of the seven compulsory subjects in the curriculum in Science and Technology [202]. The standards document draft that was published in 2004 [202] lists the areas of the environmental knowledge that the system should instill in students. The document includes five fields out of seven subjects in the curricula of 1999: Material Sciences- Materials and Energy; Life Sciences- world of living, health and quality of life; Earth and Universe Sciences; Technology- Man-made world and information and communication; and Environment Sciences- Ecological Systems and Quality of the Environment.

The standards document defines and points to values and behaviors, and states that: "The curriculum in science and technology underscores the need to deal with the implications of science and technology on individuals and society now and in the future. The exposure for the moral and

ethical implications that are related to the problems and topical issues will help in fostering values and behaviors, taking personal and social responsibility as students and as future citizens [195].

According to the lines outlined by the Standards document [195], the subject of environment is integrated in learning within the "combination" approach (infusion), in different subjects there is an affinity and addressing to the environmental aspect, therefore environmental aspects should be included in the areas that were defined.

From the formulation of the document it is clear that even those who do not learn about environment in a focused way will be exposed to the knowledge of environment out of the affinity and the addressing that connect between the topics. Without a doubt, an approach that combines between different contents can be fruitful for students, but it is not recommended as a substitute for teaching the environment as a separate unit [156].

The teachers training for teaching "Science and Technology" begins with this that most teachers in this field enter the education system with at least a bachelor's degree in scientific subject (mostly in biology, and less in chemistry and physics). Website of the Ministry of Education, journals, seminars, conferences and seminars are meant to provide updates and professionalism for teachers so they can teach the subject "Science and Technology [135].

However, Goldman [43] reported about a shortage of teachers who have appropriated training for teaching environmental studies and EE as a subject in the "combination" approach. Bloom [11] argues that the multiple fields of knowledge that teachers need, the reduction of training courses in recent years because of budget cuts and the fear from new teaching materials, slow down and disrupt the insertion of the new contents in the system.

The standards document that was published in 2004 instructs teachers to use only educational materials approved by the Ministry of Education. One of the standards document's goals (that was stated according to the government decision upon strategic plan for SD in Israel) is encouraging the process of EE for students from first grade to ninth. The implementing of the document in the system is expected to be a long process. It should be noted that the CEO circular on sustainability since 2004 [191] have an impact today and many schools use it [5].

The Ministry of Education recommends that primary students learn six hours of science and technology per week. Schools are asked to devote at least three hours per week for teaching the core in science and technology. In practice, there are schools who choose to completely give up on science and technology and devote these hours to other contents. Other schools teach less than six hours a week or devote six hours for science and technology but you cannot know how much they discuss, if

any, the environmental contents or the context of the contents on of the environmental subject, because there is no precise definition for the scope of study time that must be spent for each subject, and the teacher chooses by bias which subjects to teach and how. As a result of these circumstances, the national supervisor of science and technology does not know how many hours a week they teach science and technology in every school, and of course in the situation it is not known where and how they teach environmental studies which are included under the heading of science and technology [135]. In 04.06.2007, a CEO circular's abstract was published with the title: "EE - a key challenge in the education system in Israel, an action plan to promote EE". According to the circular, primary schools and middle schools will emphasize in 2008 the EE, multidisciplinary format. Each student will be exposed to a yearly teaching of 30 hours, within the hours allocated for the relevant subjects (such as science and technology, agriculture and geography). There will be national training courses for leading teachers in this subject, who will later train other teachers, a reader will be written and other learning materials will be distributed.

Recently an EE program was formulated to complete the famous steps published in the new CEO circular . The program is a result of cooperation between the Ministry of Education and the Ministry of Environmental protection, and according to it the environment will be the basis in schools. The Ministry of Education found that the leading schools in the environment field are those who took up the subject as a basis and treated it as part of the school vision. The program will focus on school action for community and utilization of the close environmental resources, as well as on environmental issues such as biodiversity, alternative energy and open spaces. The program Committee includes the ministry representatives, the academy and the society for the protection of nature.

Secondary schools - Each year about 100,000 students finish their studies in the school system, of which 35 to 40 thousand students studied science and technology subjects [194]. One of the science and technology professions is the Bagrut program in Environmental Sciences. In about 200 high schools, 5,000 students are tested for Bagrut in a level of three or five units each Year [181]. The program started out in 1983, when a wide committee that included professionals from many fields set a curriculum [11].

Environmental studies at high schools are taught in an independent frame, in specific trends, in contrast to the 'combination' approach in the primary grades and junior school, it is not due to a world view, planning or systematic determining as a result of planning and thought but it is the result of historical circumstances [156].

An expression to the 'Independence' approach can be found in the professions of "Environmental Sciences," "Earth Sciences" and "Science and Technology in Society". These three professions provide an exposure to environmental studies, each at a different depth, but only about 10% of high school students learn in these three professions.

Many areas of science are interrelated. Therefore, in the curricula, there is a growing recognition that it is important that scientists and future leaders know to connect between different disciplines and understand the meaning of their actions in an environmental level. The understanding that there is a need for a broad knowledge that combines between different disciplines, seized beyond the environmental daily order. While in Europe, students in high schools, learn several science professions at the same time, in Israel, also the outstanding students, learn usually one science profession because of significant cuts in recent years. This can severely damage the scientific ability of Israel in the future [194].

In the report of the steering committee for science and technology [197], there is no reference of the environment at all. The only motives specified as relevant to determine learning trends and contents are economic impulses and technological military needs. A similar approach exist in the preparation document issued by the department of information and research in the kneset towards the meeting of the Education Committee with the Committee of Science and Technology on June 27, 2006 - the motives for opening trends and determining contents are related to economy and security.

The data show that more than half of the students complete their education without any scientific or technology knowledge. Moreover, students who acquire scientific or technological knowledge study it in a focused way that prepares them to specific academic studies or to a professional continuance, and not as a broad education for EL. It seems that in high schools in Israel, less than 10% of the students have formal and systematic EE [135].

Learning Subjects - Environmental Sciences: Environmental Sciences, as a trend for "Bagrut" tests (Matriculation tests /final tests in high schools), are offered in a limited format - 3 units, or broad format - 5 units. For three years, one hour a week is dedicated per unit. In the two levels students are required to take a theoretical learning unit that forms the core of the profession: "Ecosystems and Biodiversity" and a practical learning unit called "Environmental Workshop". Within the environmental workshop, students go out to three different sites and learn them by collecting ecological data by their own in technological methods, in order to conduct a discussion which in its summary the environment can be characterized in a systemic-integrative perspective that reflects all the factors and conditions studied. In the broad level of 5 units there is also an "Ecotop" unit (similar to the "Biotop" in Biological Studies) in which students go outdoor and

characterize a conduction of a habitat. Most students choose 5 units. The rest of the learning units are theoretical and students can choose from six subjects: water resource, air resource, solid waste, noise and radiation, planning and environmental management and environmental ethics. Student who chooses this trend must take another scientific subject at least 3 units in chemistry, physics or biology [200;202;181]. School directors report that it is easy to get high scores in this "Bagrut" test and some students choose it for that reason. The contents and the teaching approach hardly relate to social and ethical sides that form an important part in the more advanced perceptions of the EE [156].

Science and Technology in Society: According to the CEO circular from June 1996 each student who doesn't study at least one subject from the natural sciences or technology need to learn the "science and technology in society" [11]. "Science and Technology in Society" result from the conclusions of Harary's committee, that calls to instill to each student scientific-technological literacy as part of the compulsory studying. "Science and Technology in Society" is taught in three units for "Bagrut" [201; 196; 192]. Only few students study today this profession but after the budget condensation, students' number is expected to be higher each year in the near future. One of the most prominent problems in teaching this profession is inadequate training, which enables teachers to instruct a broad profession that has many dimensions and multidisciplinary approach. According to Bloom [11], despite the fact that many efforts were made to activate "Science and Technology in Society" in the recommended scale, so far the implementation was delayed because of the realization that an extensive training course is required for teachers' training. Another view sees that the delay of the implementation is because the Ministry of Education didn't so far the exam in scientific subject for each student in Israel. It seems like there is a significant gap between the recommendations of the CEO circular from 1996 and the existing situation.

Earth and Environment Sciences: Another profession of 5 learning units in high schools that focuses on EE is "Earth and Environment Sciences". The purpose of this study program is to develop environmental insight. The program is based on the Earth systems approach and focuses on developing systematic thinking as a basis for developing the environmental insight.

In summary, with the increasing awareness of environmental issues, the environmental education issue was also raised on the public agenda, and in recent years it was debated several times in the Knesset Education Committee. In general, there has been a trend of expansion and reinforcement in the actions of the Ministry of Education and the Ministry for the protection of nature in the field of environmental education. Despite this positive trend, the situation of environmental education has not improved significantly.

2.2. Environmental Education Programs: Leading Programs, Effective Programs and Evaluation of Programs

EE Programs in Schools **-** There are local initiatives in hundreds of schools where parents, teachers or community seek to instill environmental contents. Such schools can find training, information resources and study programs in a variety of places: The Ministry of Environmental protection and the Ministry of Education offer an information center and school coordinators that accompany schools with EE programs [202; 203]. Many academic centers and also non-governmental organizations offer educational programs, such as the Society for the Protection of Nature, "Heschel Center" and "Karev Foundation". There are also some schools that cooperate with private organizations which have special interest in these programs. For example, Intel has funded training courses about environment in several schools, and "Tevaa" company has activated programs for teaching chemistry in Beersheba, often with a link for environmental contents. The "Israel Electric Corporation" and "Makhteshim" also support educational initiatives. The initiatives in this area are diverse and sometimes temporary, therefore making an accurate mapping of what is happening in schools across the country is a complex task. The three leading programs running across the country are: "Environment Savers" by the Society for the Protection of Nature; "Green Network" on behalf of "Karev" foundation and "Heschel" center for Environmental Learning and Leadership; and "Green Schools" by the Ministry of Environment and the Ministry of Education. The purpose of the three programs is to inspire environmental activism, often with parents and different community factors. The programs include theoretical studies, study of problems in the immediate vicinity and practical experience to solve them, and also formulating leadership by taking responsibility among children for their actions and their surroundings [199; 198; 204; 31; 40; 5]. The programs "Environment Savers", of "the Society for Nature Protection", and "Green Network", of the "Karev Foundation" and "Heschel Center", are dependent with the support of thousands of dollars a year for guiding and accompanying schools, funding from donors and fundraising in schools. The two frames are built from an array of guiding for students and teachers. The activities include going outside and getting to know the school area, the children's residence, and the community. However, the Ministry of Environment and the Ministry of Education provide "green" schools the sum of 10,000 shekels to assist in the process of the certification for "Green School". The activity in such schools requires investment and greater initiative of the teachers. The training that the ministry gives focuses on training teachers by educational materials provided by the Ministry of Environment and the Ministry of Education in regional learning centers. Dozens of schools are members in the "Environment

Savers" and "Green Network" programs and hundreds are members in the "Green Schools" program. There are duplicates of schools which are members in the "Green schools" program and also in one of the two other frames. In all, only several hundreds of primary schools of all the primary schools in Israel benefit from additional instruction and enrichment program on the environment.

The Society for the Protection of Nature: "Environment Savers" - Since 2000, the Society for the Protection of Nature operates a multi-year program: "Children Make a Change. "The program requires commitment and a lot of involvement from the school staff and the parents, and it was built in accordance with learning materials and topics of study programs recommended by the Ministry of Education. The program objectives are to promote closeness to nature and built heritage, promoting behavior change that encourages active citizenship among the school community: teachers, parents and students, creating environmental awareness and responsibility among children [204]. The ultimate goal is to internalize environmental values so that students take an active part in the action for the environment as part of an active citizenship at two levels: (1) Dissemination of knowledge to the community through parent training, press reports, information pages and the like; (2) Field activity by children and with the collaboration of the community - for example the establishment of a community garden [204]. As part of the "Children Make a Change" program, a Green Council of Students is selected, with the cooperation of an accompanying teacher, to encourage behavioral changes at school and to participate in activities throughout the country [204]. At the end of every school year, a national conference is held, each time on a different subject, aiming to bring together children from different societies and places in Israel. The program aims to empower the children who work for the environment and to increase awareness and cooperation of the authorities through engaging in a topical environmental issue. The conference is considered as a peak point in the annual education program. The Environmental program "Environment Savers" works within formal and informal education frameworks at central cities and outlying areas in order to make contact between the child and his environment in order to stimulate the child to an active involvement in environmental issues. The rationale is that teachers and students have to go through a practical process with the community. The program includes a collaboration between the Society for Protection of Nature, the local authority, the Ministry of Environment and the teachers at the school.

"Karev Foundation" and "Heschel Center": "The Green Network" - The purpose of "Green Network" is to give children the ability to shape their world out of an environmental awareness, to strengthen and lead teachers and students to take responsibility, so as to stimulate an active citizenship into them. The Green Network, encourages creating relationships for educational-

environmental activism within the school community, between communities of different schools, between environmental actives and between different professionals and educators. As a result of the joint activity of some schools close to each other, the connection element gets stronger between various elements in the community and students at schools. During work, students focus on the external environment and leave the classroom to the real life environment. Working is done in small groups in order to increase the sense of responsibility among teachers and students in each group and to allow growth of local leadership [199].

The Ministry for the Protection of Nature and the Ministry of Education: "Green Schools" **-** The Ministry for the Protection of Nature [198] in conjunction with the Ministry of Education [213] are leading for more than ten years now the certification process for "Green School". The purpose of the process is to bring the principles of SD into implementation at schools [136]. The certification constitutes a recognition with the significant EE taking place at school, and delineates a possible way of action for schools that want to start environmental activities based on existing frames. The model is based on the principles of learning about environment, implementation of a sustainable lifestyle in school, and students' activity designed to bring about a change in consciousness and behavior of the community in relation to the environment. School that meets all the criteria, wins with the certification for Green School" [136].

The Certification Framework for Green School **-** The certification process is performed according to the Ministry of Environment and the mediation of the local authorities [198]. At the end of the certification the school may receive a financial support. The guidance and the leading process is done by school teachers with the assistance of the EE coordinators in the local authorities, associations of cities and environmental units and environmental organizations involved in education [198]. At first, the school management is required, together with the students and parents to decide on their commitment to the issue. Further, the school will conduct mapping and evaluation of the current situation in the field of EE. The evaluation will be both quantitatively and qualitatively. In order to complete the picture of the situation, the school will formulate several environmental indicators that it is interested in improving and implementing within the school culture, and on this basis the school action program will be constructed referring to the six following areas: (1) An action plan for sustainable lifestyle in school that includes rational use of resources, infrastructures care, and operations in education field and behavior against students, staff and parents; (2) A green visibility program that includes signage, wall panels, website; (3) Community involvement - at least one layer is required to perform a

sustained action project for the community that aims to increase awareness of environmental issues and to bring about behavior change; (4) Green leadership - consisting of representatives of students, teachers and community, which will promote the school accreditation process; (5) A teacher training program on environmental issues and sustainability consisting of four sessions; and (6) At the end of the process the school is required to present to the jury its compliance with the required criteria and at the end of the jurisdiction process the school receives the certification as a green school [198].

In 2014, 110 schools were certified as green schools, of which 16 Arab schools (5 schools in the northern Israel). Up to year 2014, 812 schools were certified as green schools, of which 191 Arab schools (130 schools in the northern Israel) [198].

Accreditation Criteria for Persistent Green Schools - Persistent green school is required to meet broader criteria: it must meet all the criteria for at least two years, should reduce all defined resources and expand operations to all levels of the school. In other words, EE is ongoing at school and it is an important part of discourse in school and community [198]. Other criteria applicable to "persistent green school":

(1) Theoretical studies on the environment of at least 30 hours a year, for all school students (6 layers of primary school and three layers of high school).

(2) Ongoing environmental-community project, that will be carried out by at least two layers of school. Either, one big project carried out extensively by two layers, or two small projects carried out by each layer separately.

(3) Rational use of resources at the following environmental aspects: saving electricity, saving water, saving paper, reducing waste production and increasing recycling [204].

Other deliverables of the accreditation process which are expected to appear: Improving school climate and reducing violence; Increase in the level of educational achievements among students; Linking the student to his home; Reducing the amount of waste and debris in school; Significant reduction in water and electricity bills; Immediate financial gains from deposit law and waste collection; Increased environmental awareness; Achieving widespread local publicity for the institution; Networking with other schools worldwide; and Financial assistance of the Ministry of Environment to create the infrastructure and to train teachers at school. Schools participating in the present study are regular schools (non- green) and green schools that part of them participates in the certification process for persistent green book [204].

Elements of Effective EE Programs - Today, more than ever, there is a need for the preparation of world problem solvers because of the increasing number of the complex environmental problems [1]. Educators' role is not only to present information but also to help creating environmental literate learners. Thus the goal of EE is to instill in learners knowledge about the environment, positive attitudes toward the environment, competency in citizen action skills, and a sense of empowerment [27]. In order to reach this goal of EL, EE programs must be effective. Effective EE programs are relevant to the mission of the organization, to the educational objectives of the audience, and to the everyday lives of the individual learners. They involve stakeholders in all stages of the program, from the development of the program to its evaluation. Effective programs empower learners with skills to help prevent and address environmental issues and with a sense of personal and civic responsibility. Further, they are accurate and balanced, incorporating multiple perspectives and interdisciplinary aspects. Effective EE programs are instructionally sound, using "best practices" in education. And finally, effective programs are evaluated with appropriate tools [1].

According to the North American Association for EE (NAAEE) [95], excellent non-formal EE programs must: be designed to address identified environmental, educational, and community needs and to produce responsive, responsible benefits that address those identified needs; support and complement their parent organization's mission, purpose, and goals; be designed with well-articulated goals and objectives that state how the program will contribute to the development of EL; be planned carefully in order to ensure that well-trained staff, facilities, and support materials are available to accomplish program goals and objectives; be built on a foundation of quality instructional materials and thorough planning; and define and measure results in order to improve current programs, ensure accountability, and maximize the effects of future efforts [95].

According to Brock and Crowther [13] effective EE programs must be connected to nature. They claim that even though the children's interaction with nature has changed drastically in the past few decades because of the changes in the society, the nature can be very beneficial, so organizations and researches who are aware of this, have developed new environmental programs to help children strengthen their connections to the natural word. EE programs should be related to adventure because adventure education help students to step away from complexities and distractions of day-to-day life.

According to Shooter and Furman [145] there are three primary reasons why adventure education programs fit well within the socio-ecological model. Both of them regard positive behavior change as a desired outcome, offer insights to address environmental problems and highlight our

social and environmental interrelatedness. Adventure education provides a unique opportunity to learn directly about both human and ecological interrelationships and can be an effective way to teach systems thinking.

Evaluation of EE Programs - When the word evaluation is used people get their backs up and feel like they are going to be judged. We as humans evaluate all the time. Evaluation is a term that is used to represent judgments of many kinds [137]. Evaluation is the systematic assessment of the operation and/or the outcomes of a program or policy, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program or policy [185]. According to review the existing literature there are several definitions of evaluation.

Formative and Summative Evaluation: Formative evaluation produces information that is fed back during the course of a program to improve it. Summative evaluation is done after the program is finished, and provides information about its effectiveness [137].

Outcome and Process-Based Evaluation: Outcomes refers to the results of a program. The Process-Based Evaluation is a systematic assessment of what is going on or its outcomes.

The formative-summative and process-outcome evaluations have different implications. Formative and summative refer to the intentions of the evaluator in doing the study – to help improve the program or judge it. Process and outcome relate to the phase of the program studied.

Evaluation may not be worthwhile when it has not much going on and it's not stable; when those involved in the program don't agree with what it is trying to achieve or if goals were perceived differently and staff are probably working for different purposes; when the sponsor or program manager puts many important issues off limits.; and when there is not enough funds, resources, or when the staff is not skilled to conduct the evaluation [163]. Evaluation helps organizations make wise planning and management decisions [112].

If we look at the evaluation as a part of the EE programs, it will improve program quality and student learning and will help program to achieve its goals [163].

The Basic Components of Evaluating EE Program - According to the literature, there are more than thirty different types of evaluation. The most used evaluation models are: Needs Assessments, Cost/Benefit Analysis, Effectiveness, Goal-Based and Process-Based. Evaluating an environmental program is not intimidating, it is possible even for those who have never done it before [163]. According to McNamara, evaluating with an average effort is better than no evaluating at all. In order to improve a program, one must think about what he needs to know in order to make the right decisions and to think about how to collect and understand that

information [87]. In order to evaluate a program, several steps must be done: Deciding what we want to assess; Selecting an evaluation design that fits the program; Choosing methods of measurement; Deciding whom to assess; Determining when to conduct the assessment; and gathering , analyzing and interpreting the data [125].

Outcome-Based Evaluation - The Outcome-Based Evaluation is one of the most program evaluations used by non-profit organization [137]. It looks at the changes to the clients, as a result of the efforts during and after their participation in the program. The Outcome-Based Evaluation is based on a logic model (fig. 2.1) that helps to understand what the project is doing and what it is changing:

Inputs ⟶ **Activities** ⟶ **Outputs** ⟶ **Outcomes** ⟶ **Impact**

Fig. 2.1 - Outcome-Based Evaluation Model:

Input: The materials and resources used in the activities; **Activities:** What is done with the inputs to create the change; **Outputs:** The most immediate results; **Outcomes:** Actual changes for participants/the true changes that occur; **Impact:** The longer-term change hoping the project will create**.**

The success of a program depends on the indicators that measure any or all of the outcomes: outputs, outcomes and impact. Indications are measured by using instruments such as questionnaires or surveys and may be either quantitative or qualitative. The Outcome-Targets are the outcomes we hope to achieve. In 1999, Carter McNamara, in his Basic Guide to Outcomes-Based Evaluation, suggested several steps to follow in order to understand and conduct Outcome-Based Evaluation: (1) Choosing a program that has a reasonably clear group of clients and clear methods to provide services to them; (2) Considering timeframe and what can be evaluated within it and choosing the outcomes that can be examined; (3) Choosing an indicator for each outcome; (4) Gathering data and information to assess each indicator; (5) Piloting: thinking of the first year of applying the outcomes process as a pilot process; (6) Analyzing and reporting evaluation results [163].

Building An Action Plan For Program Evaluation - The best time to build an action plan is at the outset of the program. But, an evaluation plan will always provide benefits, even if the program was at an advanced stage [163]. In general, inputs and activities focus on the program, whereas outcomes and impacts center on changes to the learner. The learner should be kept in the center of the process. An evaluation plan must take into consideration that outcomes pertaining to knowledge, skills, and attitudes can generally be expected to be achieved in the first days or

weeks but the inculcation of values, and the occurrence of desired behaviors, will take longer (perhaps several months). In order to measure the outcomes we hope to achieve, a variety of quantitative and qualitative indicators for each of these outcomes and how these indicators would be measured, and by whom, must be included in the plan. At the end, after compiling all the results a report can be produced summarizing results and lessons learned.

Difficulties In Evaluating Environmental Programs - Environmental programs, at first, increase students' awareness of and understanding about environmental issues. Later, students develop a fairly widespread system of beliefs. These beliefs, once combined with some emotional tendencies, comprise attitudes. A meld of closely aligned attitudes form values. Environmental programs should persuade the students to make their behavior consistent with their values. When values are coupled with a strong sense of motivation students can do better and this is how learners get to action. Evaluating EE is not only about counting numbers, doing simple pre-post treatment surveys, looking for short-term changes, measuring things, and then writing a report. EE is about meaning, influence, impacts and look at things that become apparent over the long term. This is what must be considered when looking at the effectiveness of EE. The ways in which EE can change someone's life, are much more subtle and difficult to measure [163]. Probably because evaluation is not something evaluators have received training in, nor is it something they are necessarily drawn to – frankly, they would rather be in the classroom or in the field. Most of the evaluators, evaluate their programs because of the reporting requirements attached to a received grant, or because they and their participants have legitimate questions about the efficacy of their programs. Most educational programs aim to change the behavior of students or contribute to the environment, therefore evaluators think about the best measurement instruments used to measure behavioral change. It is very difficult to suggest detailed indicators or instruments to measure such things as values shift, behavioral change, environmental action, or even discrete benefits to the environment that result from an EE program. The use of two or more techniques to measure outcomes that point to the same result, are mutually complementary and strengthen the case that change occurred. The best way to measure change is to use testing instruments that examine the subject at two different times, both before and after a learning experience (pre/post testing), otherwise it should rely reconstruction, in which subjects make claims about 'the way things used to be'. Often, these claims tend to remain unsubstantiated. Although we refer to both techniques below, those that rely on reconstruction tend to be of lesser validity than those based on pre/post testing. Measuring Values Shift: By measuring values we

can make conclusions about beliefs and attitudes because values subsume the 'sub-concepts' of attitudes and beliefs. A person will hold hundreds, if not thousands of beliefs, a smaller number of attitudes and only dozens of values [15]. Some people think that it is more important to focus on behavior than values or attitudes because behaviors come about as a result of a values shift. But in some cases thought does not always translate into action and values shift are the only thing that changes. Measuring values shift could be done by several instruments such as questionnaires or/and interviews, focus groups, review of peers, student art work and feedback form [163].

Measuring Behavior Change: Environmental action is behavior that intentionally tries to do something to help the environment. According to Hammond [48], five types of behavior can be classified as environmental action: Persuasion, Consumerism, Political Action, Eco-management and Legal Action. Behaviors, on the contrary of values changes, that occur during or right after the program, take longer time to manifest themselves. Hence, another problem appears, which is that some of the changes in behavior might be caused by other things and not the EE program. Measuring behavior change could be done by several instruments such as questionnaires or/and interviews, observations, focus group, student art work and feedback form.

Measuring Benefits to the Environment: Benefits to the environment means how the project will improve the environment or how higher protection of the environment will result from the project. Students who have values toward the environment and their behaviors are considered as environmental actions may not do anything that benefits the environment or they may do something but not in the period that we can measure. Benefits of types of environmental actions may never exist and others can be documented or measured by several instruments such as interviews, before and after scenarios and judicial decisions. One approach acknowledges that some of the benefits of EE are either difficult to measure because they are impractical, or truly intangible therefore what we can rely on is the best judgment of practitioners. Professional judgment can help identify elements of EE programs which in their turn can help lead learners towards action. Evaluating EE programs is very important in order to improve these programs and to ensure their effectiveness. Many researchers have come to the conclusion, from their researches, that certain environmental programs are not particularly effective and must be improved. In 2014, Saribas, Teksoz and Ertepinar conducted a research that examined 61 elementary teachers' EL and self-efficacy beliefs. The findings showed that the teachers did not have sufficient environmental knowledge or self-efficacy beliefs although their environmental attitudes, concerns, and perceptions regarding environmental issues were relatively high, therefore the conclusion was that environmental programs should be improved [126]. Although

the main purpose of the EE is to create environmental literate students but the EE programs sometimes do not achieve the target therefore an evaluating of EL is critical in any phase in order to examine the effectiveness of the programs. In 2013, for example, Stevenson et al., conducted a study that compared EL between environmental and non-environmental middle schools in California in USA. One of the results showed that environmental schools were not associated with improved EL, but the use of published EE curricula paired with time outdoors represents a strategy that may improve all key components of student EL. Also advanced teachers' experience help to boost student EL levels. The conclusion is that EE program should be studied carefully and must take in account all components of EL [151]. Researchers estimate that consulting with external organizations in order to conduct environmental programs in school is a very important and effective matter. Some schools have implemented outsourcing (using environmental programs developed by external organizations) for conducting value-based EE. In 2014, Goldman, Ben-tzvi and Shahrabani, conducted a study that examined the influence of participating in "the Green Council Programme", developed by the Israeli Society for the Protection of Nature, on the components of the EL of junior-high school students. The results showed that the contribution of the program to the cognitive component was limited, whereas the contribution to the sensitivity to human–environment interrelationships and to develop an ecological worldview was high. At the end of the program participants moved from an Anthropocentric to more ecocentric orientation. This assures that non-formal EE programs could be effective and cause increasing of EL [41]. In this study, evaluation of the effectiveness of the program "Green School" is based on the "Outcome-Based Evaluation" model with emphasis on values and behaviors. Examining the changes in values and behaviors will be performed in two different times (Pre-Post), before and after a training experience, by questionnaires, interviews and focus groups.

In summary, there are many environmental education programs running within schools throughout the country, under the supervision of the Ministry of Education, the Ministry of environmental protection and other organizations. These programs must be effective in order to realize their goals. It is very important to evaluate these programs during and after it's finished, despite the difficulties that we might face during the evaluation process, in order to improve these programs and to ensure their effectiveness.

2.3. The Arab Society in the Environmental Education Context

The Arab society has been living in Israel for many generations. In the Arab society there are diverse populations (farmers, Bedouins and urban) that their relation to their environment is affected

from their traditional lifestyle [140]. Environmental aspects, in the traditional lifestyle, include, farming clean from chemicals, rainfed agriculture and water saving agriculture, consumption of homemade or local products, using local medical herbs and spices, exploring the surrounding environment in an intimate way, connection and belonging to the place, family olive harvest, reusing products and more [140]. Today, few are the young who grow in a traditional lifestyle, but some of these aspects are preserved and integrated into the modern lifestyle.

Tarabaih [160], lists the environmental issues that Moslem sources deal with, extensively: the importance of water and conservation of water resources; The importance of air and conservation of air resources; Conservation of the various natural resources and pollution prevention; Conservation of flora and fauna and biodiversity; Importance of maintaining environmental balance; Conservation of nature and environment regarding all the biotic and abiotic components; Wise use of resources to human needs for material and spiritual targets, while maintaining the delicate balance between the various components in land and sea and preventing the formation of nuisances that can harm the human.

Environmental aspects can be found also in the other religions and traditions among Arabic speakers in Israel. The moral and practical basis of sustainability exists In the traditional religion and lifestyle. This is an important tool in promoting sustainability education in the Arab sector. In spite of the environmental aspects in religion and tradition, the Arab public is perceived as a public that has low environmental awareness both in his own eyes and in the eyes of the general public [140]. This stems from neglecting infrastructure (mainly sewage and garbage collection) in the Arab communities and neighborhoods. A neglect that is not related specifically to citizens but is the responsibility of local authorities and the state. Until today, no study was done to examine the level of cleanliness (e.g. trash dumping) in the different sectors in Israel. The problem in villages is infrastructures: no infrastructures, no transfer stations, no solutions for construction waste and solid waste, entire communities are not yet connected to the sewage system, therefore students can learn and learn and at the end they want a solution but they don't know what is the solution and Where else they can throw the garbage. If there were infrastructures like in the Jewish sector, the situation will improve a lot. Another problem is that the educational system must write educational programs in Arabic language that suit the situation in the Arab society and not to translate because the situations are different and if translating then there must be intrinsic adjustments [140].

Among the Arab society, the relation to environment, in the Israeli context, is complicated. For several people, development of the environment by and for the needs of the Jewish people (for

example establishing new Jewish settlements, developing the forests of JNF (Jewish National Fund), the green patrol) creates antagonism and politicization of the environment. For others, the environment is perceived as a global and apolitical topic, which is worthwhile to act in it for the Arab public welfare in particularly, and for the Israeli citizens in general. The environment domain creates also equivalent employment opportunities which are required among young Arabs. Researches around the world show that differences in religious belief and ethnic background are related to differences in environmental attitudes, but not necessarily to lesser extent of environmental attitudes. For example, it has been found that traditionalism is related to ethnocentric environmental values and not biocentric (according to these values man is more important than other creatures) but not necessarily lesser extent of environmental values [132]. In another research, it was found that environmental values are revealed in different groups in the population regarding different environmental topics [186].

According to Negev and colleagues [103], most schools in the Arab sector are not exposed or are exposed very little to the environment. The exceptions are the schools in which a director or teacher promote this interest, often in conjunction with an external factor . About 2,000 twelfth grade students are tested each year within "Bagrut" tests (5 units), in "Environmental Sciences". These students who are exposed to environmental issues are a minority out of all students.

However, in comparison between the Jewish and the Arab sector in the environmental aspect of school children, students and teachers, no conclusive findings were found . According to Methany's study [89], who examined the characteristics of the environmental attitudes of teachers from the Arab sector in Israel, perceptions regarding the role of the EE in their eyes and the links between their environmental attitudes and their role perception, Methany [89] concluded that teachers among Israeli Arabs hold environmental attitudes that match the approach that advocates the preservation of the environment and the promotion of ecological values. These attitudes make them suitable to serve as agents of change in promoting appropriate ecological attitudes, but the perception of their role as active designers of environmental attitudes and behaviors among their students is inadequate. Most of them see their educational role as information transmitters about issues relating to prevailing environmental perceptions.

Goldman, Yavetz and Peer [45] have shown in their study that dealt with the EL of educators, that there are significant differences between Jews and non-Jews in most behavioral categories examined. Jewish students were more active than non-Jewish students in the behavioral categories reflecting low environmental commitment as wise environmental consumption and collection for recycling. Non-Jewish students reported a distinct high level of activity in categories that reflect high

environmental commitment such as environmental activism and activities for the public without personal financial gain.

Nasser, Nasser and Monsonego [98] noted in their study that dealt with attitudes and willingness to act for the environment, that in comparison between educators and students (Arabs and Jews), it has been found that the positive attitudes of the participants regarding environmental issues reflect the importance they attach to the subject of the environment and the feelings of sympathy for protecting the environment. Positive attitudes as it turns out from the correlations examination, are related to the high level of awareness concerning environmental problems and to the level of factual knowledge on environmental issues. Educators reported positive attitudes in relation to students, and Arabs reported more positive attitudes in relation to the parallel group from the Jewish sector.

In addition, in a study of 3121 students in grades six and twelve in 77 schools in the school system by a staff of researchers from Ben Gurion [155], they examined and assessed the different dimensions of the EL (knowledge, attitudes and behavior), the connection between them and their connection to demographic data and to the direct experiences in nature. This study compared between three demographic groups: the state sector, the state religious sector and the Arab sector, and it was found that in the knowledge dimension, the Arab sector was much lower comparing to the two other sectors in grades six and twelve alike. However, in the attitudes dimension, although the Arab sector was indeed lower than the two other sectors, but the gap was more moderate, while in twelfth grade, the opposite trend was found, the Arab sector had the highest environmental attitudes. In the behavioral dimension there no significant difference between the three sectors was found.

These researches corroborate the claim of the multicultural approach, that according to it, there is no such group in the population which has environmental attitudes and that other groups must be aligned according to their attitudes. But each group has values, cultures and lifestyles that include important environmental aspects, whether they are identified as so or not. Also, each group in the population can and should learn from the other groups in the moral aspect and the practical aspect [69; 70].

In this context it is important to indicate that the environment is perceived as a possible bridge in mixed educational programs for Arabs and Jews. There are several bodies that work in this field, and these programs are a field for mutual learning. Mutual learning about environmental aspects in different cultures in Israel can also be integrated in the educational system. Events about EFS, such as conferences, advanced studies, competitions and other events, can be a place for meeting and mutual fertilization for Arabs and Jews. A problem that has raised in many contexts in several researches is

the language gap. Most of those who work in EFS are Jewish (non-Arabic speakers), and most of the existing teaching materials are in Hebrew. This also exists in the governmental offices, non-governmental organizations and other bodies. This makes it very difficult to contact and work with Arab students, mainly in primary and intermediate schools. Another cultural difference is the support of parents and Authorities. Fundraising is not acceptable in the Arab sector, therefore it is important to think about other ways of giving for cultural target. Giving, in the sense of recruitment to a project, such as recruitment of parents or mothers for a period of time. Time is also a resource that can be translated into money.

In summary, in spite of the environmental aspects in the religion and the traditions of the Arab public, it is perceived as a public that has low environmental awareness both in its own eyes and in the eyes of the general public. Therefore, if in general in Israel, there is a place for improvement regarding the awareness level and the environmental actions, the problem in the Arab sector is much more tangible, and the lack of awareness is expressed in serious environmental problems.

2.4. Conclusions to the second chapter

The EE in Israel is based on the government decision from May 14, 2003 regarding a strategic plan for SD in Israel. Since this decision the Ministry of Education in Israel has called for the prioritization of EE programs in schools. As mentioned above, the goal of EE is to instill in learners knowledge about the environment, positive attitudes toward the environment, competency in citizen action skills, and a sense of empowerment. In order to reach this goal, EE programs must be effective. According to researchers in this topic, effective EE programs empower learners with skills to help prevent or deal with environmental issues with a sense of personal and civic responsibility. Effective programs must be accurate and balanced, that incorporate multiple perspectives and interdisciplinary aspects. They must use the best practices in education, and must be evaluated with appropriate tools.

One of the leading programs running across the country is the "Green School" program. The Ministry of the Environmental Protection in collaboration with the Ministry of Education are leading for more than ten years now the certification process of "Green School". This program assists students to develop EL and to become environmentally literate and responsible citizens. However, the effectiveness of such programs has not been examined enough and there are limited studies on students' EE achievement in primary schools especially in the Arab sector in Israel.

Evaluating EE programs is very critical and important for achieving its goals. This study focuses on evaluating the effectiveness of the program "Green School" program and the intervention program and their impact on environmental perceptions and EL of students.

According to Israeli researchers in this topic, most schools in the Arab sector are not exposed or are exposed very little to the EE and most of the teachers in Arab schools see their educational role as information transmitters and not as designers of environmental behaviors. The Arab society in Israel public is perceived as a public that has low environmental awareness both in its own eyes and in the eyes of the general public. Therefore, if there is a room to improve the environmental literacy level of the citizens, there is a need to invest a lot in the Arab sector because the problem of environmental education in this sector is much more tangible and the lack of knowledge, and awareness regarding environmental issues is expressed in many serious environmental problems.

Next chapter focuses on the methodology of the research, the intervention program that this research relies on, findings concerning the students' EL, findings concerning environmental perceptions and perceptions regarding environmental programs of teachers and students, conclusions and recommendations.

3. EXPIREMENTAL VALIDATION OF THE EFFECTIVENESS OF THE METHODOLOGY OF THE STUDENTS' ENVIRONMENTAL LITERACY AND PERCEPTIONS OF STUDENTS AND TEACHERS

3.1. Structure and phases of the research, data collection and the intervention program

Research Design – The main aim of this research is to analyze the impact of EE programs on sixth grade students' EL level and to identify environmental perceptions and perceptions concerning environmental programs of teachers and sixth grade students in green and non-green schools, in the Israeli Arab sector. The main objectives of this research is to evaluate the existing EL level of sixth grade students at primary schools in the Arab sector while comparing between green schools (which have "green school" program running into it) and non-green schools (which does not have environmental programs running into it), to compare correlations between EL components, to analyze the impact of background variables on EL, to offer an intervention program that aims to raise the students' EL level, and to determine and to track environmental perceptions and perceptions concerning the environmental programs, of teachers and students involved in the program. The intervention program is essentially an annual course, intended for teachers, consisting 14 sessions of two / three academic hours each (total of 30 teaching hours). The program included lectures, workshops and tours related to environmental issues, in which issues were raised, discussions were conducted, teachers learned teaching models, worked in groups, watched movies and presented lessons that they have already gave or will give to their students, about environmental issues, in their expertise field. Materials, from the teachers' experiences in the field, were also raised and discussions were held concerning these materials (presentation and case study). The workshops were supposed to prepare and accompany the teachers in their practical work at school concerning the subject EE. In order to achieve the above goal three main questions, which were formulated on the basis of the literature review, must be answered:

The main research questions:
- What is the existing EL level of sixth grade students in the Arab sector in relation to the type of school (green school, non-green school)?
- Are there differences in the EL level of sixth grade students in the Arab sector between the beginning and the end of the school year in relation to the type of school (green school, non-green school, non-green school with teachers' intervention program)?

- What are the perceptions (environmental perceptions and perceptions concerning the goals and the effectiveness of the environmental program) of teachers and students involved in the environmental programs?

The main hypotheses:

The EL level among all students will increase. The difference between green schools and non-green schools will be significant in favor of the green schools. The EL level among students in non-green school with an intervention program, in relation to green schools and non-green schools, will be higher.

A positive impact of the intervention program, will be found, on the perceptions (environmental perceptions and perceptions concerning the effectiveness of the environmental program) of the students and the teachers involved.

As part of the science and technology studies in all primary schools, students, from the first grade up to the sixth grade, learn about biotic and abiotic elements of environment and understand processes in the environment and interactions between elements. They learn about the position of human in the environment and his involvement in it and they develop awareness of the need for a SD and they demonstrate personal responsibility for maintaining and protecting the natural values and the environment [195]. Therefore, it is likely to have a raise in the EL level of the sixth grade students' at the end of the year compared to its beginning (regardless the environmental programs).

Secondary questions and hypotheses:

Question (1): Are there differences in EL level of 6TH grade students in relation to **gender**?

Hypothesis (1): No differences in EL level of 6TH grade students will be found in relation to **gender**.

Question (2): Is there a significant effect of **parents' education** on 6TH grade students' EL level?

Hypothesis (2): A positive connection will be found between **parents' education** and 6TH grade students' EL level.

Question (3): Is there a significant effect of **parents' profession** on 6TH grade students' EL level?

Hypothesis (3): A positive connection will be found between **parents' profession** and 6th grade students' EL level.

Question (4): Are there differences in EL level of 6th grade students in relation to **source of knowledge**?

Hypothesis (4): No differences in EL level of 6th grade students will be found in relation to **source of knowledge**.

Question (5): Is there a significant effect of **time spent outdoor** on 6th grade students' EL level?

Hypothesis (5): 6th grade students who **spend more time outdoor** exhibit a higher EL level.

Question (6): Is there a significant effect of environmental **awareness** on 6th grade students' EL level?

Hypothesis (6): 6th grade students who are **more aware** of environmental issues exhibit a higher level of EL.

Question (7): Is there a **correlation** between the EL components?

Hypothesis (7): There is no **correlation** between the EL components.

The traditional approach that was accepted until the eighties in the research field of the EE was based on quantitative scientific methods [59]. During the last two decades there has been a significant development in this area following the change in the ecological world view and in the perception of the educational research in general. Following this, the need to expand the methodological basis of the EE and to include a wider range of methods that can meet a wide variety of research questions was arose. This matter allowed to expand the areas of research in EE beyond learning. This study is based on a mixed research method that combines between the quantitative method and the qualitative approach. Using mixed research arrays allow researchers to mix and to match between components of the study array and due to this they have the best tools to provide answers to specific research questions. Therefore using mixed research arrays has become a common practice among researchers in general, and among evaluators in particular [99].

During the research, data was collected through questionnaires, interviews and focus groups, and the data analysis combined qualitative and quantitative approaches depending on the research questions. The use of quantitative research helped to examine the existence and the prevalence of the phenomena being studied [166; 144; 23]. The use of qualitative helped in obtaining a clearer picture, complete and reliable, and allowed to understand deeply the phenomena being studied. The use of various research tools reinforced the findings, increased the validity and reliability of the research through a correlation between the results (triangulation) and expanded the field of research (expansion). The theoretical framework of the research is broad and consists of four main areas: EE, EL, environmental programs and environmental perceptions. Programs investigated in this research are based on this basis. Below, table 3.1 presents research questions, data collection tools and data analysis.

Table 3.1 - Research questions, data collection tools and data analysis

Research questions	Data collection tools	Data analysis
1. What is the existing EL level of sixth grade students in the Arab sector in relation to the type of school (green school, non-green school?) 2. Are there differences in the EL level of 6TH grade students in primary schools in the Arab sector between the beginning of the school year and the end of it in relation to the type of school (green school, non-green school and non-green school with intervention program)?	Questionnaires	Statistical analysis of the questionnaires + inductive content analysis of the open part of the questionnaire
3. What are the environmental perceptions and perceptions regarding the goals and the effectiveness of the environmental programs of teachers and students involved?	Interviews pre-post Focus groups pre-post	Content analysis based on literature + inductive content analysis

The main goal of the research is to examine the impact of EE programs (the green school program and the intervention program) on sixth grade students' EL level and to identify environmental perceptions and perceptions concerning environmental programs of teachers and sixth grade students in green and non-green schools, in the Arab sector. **The research objectives are** to evaluate the existing EL level of the students; to examine the impact of green school program on students' El level; to examine the correlation between EL components (knowledge, attitudes, affect, behavior and skills); to examine the impact of background variables (environmental awareness, source of knowledge, gender, father's education level, mother's education level, parents' profession, time spent outdoor) on students' EL level; to offer an intervention program that focusses on training teachers to integrate EE in their work plan and aims to raise the students' EL level); to determine the impact of the intervention program on students' El level and perceptions of teachers and students involved. Data were collected according to the main goal and objectives of the research. Below (fig. 3.1) and (fig. 3.2) present the research framework and focus and the research theoretical model.

Theoretical Framework:
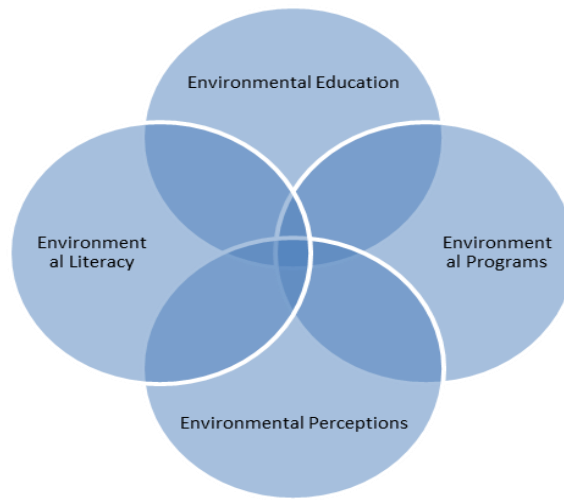
Research focus and data collection:

1

| Environmental literacy of students from all five green and non-green schools

through questionnaires | Environmental perceptions of teachers and students in a green school and a non-green school

through interviews and focus groups for students |

2

| Passing the intervention program to a non-green school |

3

| Environmental literacy of students from all five green and non-green schools

through questionnaires | Environmental perceptions of teachers and students in the non-green school where the intervention program was passed

through interviews and focus groups for students |

Fig. 3.1 - Research framework and focus

Environmental literacy

- Awareness
- Knowledge
- Attitudes
- Affect
- Behavior
- Skills

Background variables:

gender /
source of knowledge /
parents' education /
parents' profession /
time spent outdoor /

Type of school:
green school /
non-green school /
non green school with
intervention program

Environmental Perceptions of students and teachers

Fig. 3.2. Theoretical model of the research

Research environment - This current research focused on environmental programs operating in primary schools in the Arab sector: The "green school" program and the intervention program which is actually a training course for all the teachers staff at school. The reasons why these programs were chosen because they are appropriate to the approach of education for sustainability (EFS), which this research relies on. These programs are actually long-term programs and according to Rickinson [116] and Rickinson et al [115], long-term projects have a higher impact on the perceptions of teachers and students and on students' EL. These programs are based on school-community means that they take place around the school or nearby as part of the curricula and sometimes as a supplement to the curriculum and they incorporate community involvement and this meets the definition of Rickinson and colleagues [115] regarding the EFS.

In this research two groups were involved: sixth grade students of five primary schools in the Arab sector, two green schools (with "green school" program) and three non-green schools (without environmental programs) and teachers from one green school and one non-green school (in which the intervention program transferred). Sixth grade students were selected in this research since on the one hand they are fluent enough, it's their last year at school, they studied various issues relating to the environment and it is expected from them to express an opinion on issues related to the environment.

Therefore they can be asked about their perceptions toward issues they had learned in primary school over the years. And on the other hand, students in primary schools are an excellent target population for EE because they are relatively not old and it's still possible to influence their knowledge, awareness and behavior. Such researches, that focus on students of primary schools, can contribute a lot to raise the level of EL of students in primary schools in the future, because as we start raising environmental awareness at a younger age the better the chance to develop in children a deep appreciation for nature as part of their values system. Children in the early childhood years develop an understanding about the world through play, exploration, and creative activities as well as by watching and imitating adults and other children.

The teachers' environmental perceptions regarding the integration of environmental programs within the framework of both the formal and informal curriculum, their considerations and the extent of their involvement are very important and reflect how important is it to school to maintain these programs and promote and adapt them to the spirit of the school.

In the first phase of the research 361 students have participated: 211 students from three non-green schools and 150 students from two green schools. In the second phase of the research 351 students have participated: 207 students from three non-green schools and 144 students from two green schools. Number of students who have participated in the intervention program was 73 students from non-green school and the number of teachers who have participated in the intervention program was 22 teachers from the same school. The teaching staff included: 4 Arabic language teachers, 3 Mathematics teachers, 3 Science teachers, 2 English Language teachers, 3 Hebrew language teachers, 1 Geography teacher, 2 homeland and sports teachers and 4 teachers of grades 1 and 2 (table 3.2).

Table 3.2 – Number of schools and students participated in the research

	Type of school	Number of schools	Number of students
At the beginning of the year	Green school	2	150
	Non-green school	2	138
	Non-green school + intervention program	1	73
	Total	5	361
At the end of the year	Green school	2	144
	Non-green school	2	136
	Non-green school + intervention program	1	71
	Total	5	351

The students who have participated in the beginning of the school year are the same students who have participated at the end of the school year, except for a small number of students who have participated only at the beginning of the school year or only the end of the school year that were present at only one of the two periods. The data was compiled by researcher.

The questionnaires were printed on four A4 pages on both sides which included 92 questions on 8 pages. The time that was allotted for students to answer the questionnaire was 60 minutes. The students received a brief explanation before they started filling the questionnaires. It was also explained to them that the purpose of this questionnaire is to develop the EE in our community and that it is important to know how they feel, what they do, how they think and what they know today regarding the environment. They were asked to answer the questions seriously and honestly and regarding the questions in which they were asked to meet and express a personal opinion, or report the behavior and customs, no answer is right or wrong. They were told that the questionnaire is not a test and there are no grades for the answers, the questionnaire is an anonymous questionnaire.

The distribution of all the questionnaires in all the classes of all types of schools that participated in the research had passed with no interference or special events.

Statistical Analysis: The answers to the questionnaire were typed to excel software and were statistically analyzed. Data analysis was performed for each of the components of the EL (knowledge, attitudes, affect and behavior) separately, while comparing between the different types of schools that participated in the research. The analysis was done by T tests (statistical examination of two population means) that examines whether two samples are different. The relations between the independent variables and the EL were also held by T tests when the independent variables divided the population into two groups [184] (for example gender and parents' work) and by One Way Anova tests when the independent variables divided the population into three or more groups (for example father's education, mother's education and time spent outside). Matching between EL components was done by correlation tests of pearson that examines a linear correlation between two variables, giving a value between +1 and −1 inclusive, where 1 is total positive correlation, 0 is no correlation, and −1 is total negative correlation. It is widely used in the sciences as a measure of the degree of linear dependence between two variables. Alpha cronbach tests were conducted to the questionnaire parts that examine the attitudes, the affect and the behavior.

Structure and phases of the research:

Evaluating the EL level in five schools through questionnaires (quantitative analysis). (At the beginning of the school year).

Examining the environmental perceptions and attitudes of teachers and students, regarding environmental programs, in one green school and in one non-green school through focus groups and interviews (qualitative analysis). (At the beginning of the school year).

Planning, building and giving an intervention program to teachers in a non-green school. The program was built on the basis of the findings of the questionnaires, interviews and focus groups. The purpose of the intervention program is to raise the level of EL of students. The intervention program is intended to all the teachers at school in the form of environmental workshops and focuses on the following issues: the environment as a source of knowledge, outdoor learning, environmental crisis, EE, EL, effective environmental programs, "green school" program, planning and giving lessons about environmental issues and planning and operating environmental projects (during the school year).

Re-examining the environmental perceptions and attitudes of teachers and students regarding the environmental programs in the non-green school in which the intervention program was run through focus groups and interviews (qualitative analysis). (At the end of the school year).

Re-evaluating the level of EL (in the same five schools) through questionnaires in order to determine if the time has an effect or if there is a change following the intervention program, and if so, what it the change. The rest of the schools that didn't have an intervention program will be used as control groups. (at the end of the school year). Schedule of the research stages (table 3.3) and stages of the research (table 3.4) are presented below.

Independent variables of the research - Students' background variables (demographic variables): gender, parents' education level, parents' profession, source of environmental knowledge, experience in the natural environment, measurement time, type of school and participating in the intervention program.

Dependent variables of the research - Environmental literacy of students. This research examines the environmental literacy level regarding its various components: knowledge, attitudes, affect, behavior, awareness and skills.

Table 3.3 - Schedule of the research stages

Schedule	Type of action	School (1) non-green	School (2) non-green	School (3) non-green	School (4) Green	School (5) green
Nov 2014	Questionnaires for students (pre)	√	√	√	√	√
Nov-Dec 2014	Focus groups for students and personal interviews for teachers (pre)	√			√	

Nov-June 2015	Intervention program	√				
May-June 2015	Focus groups for students and personal interviews for teachers (post)	√				
May-June 2015	Questionnaires for students (post)	√	√	√	√	√

Table 3.4 - Stages of the research

Schools participating	At the beginning of the year	At the end of the year
school no' 1,2,3 (non-green) + school no' 4,5 (green)	**Questionnaires** to determine the students' environmental literacy level.	**Questionnaires** to determine the students' environmental literacy level.
school no' 4 (green)	**Focus groups** for students to examine the environmental perceptions and perceptions regarding the environmental programs (before and after the intervention program). **Interviews** for teachers to examine the environmental perceptions and perceptions regarding the environmental programs	
School no' 1 (non-green)	**Focus groups** for students to examine the environmental perceptions and perceptions regarding the environmental **Interviews** for teachers to examine the environmental perceptions and perceptions regarding the environmental programs *An **intervention program** intended for teachers. (During the school year)	**Focus groups** for students to examine the environmental perceptions and perceptions regarding the environmental programs **Interviews** for teachers to examine the environmental perceptions and perceptions regarding the environmental programs

The research procedure - After receiving the confirmation from the chief scientist (Appendix 2) of the Ministry of Education, a message was sent to the directors of all five schools and after coordinating and obtaining their agreement and the parents' agreement (Appendix 3), the questionnaires were distributed to the sixth grade students during one of their regular school days. It was made clear to all students, out of honesty, the purpose of filling out the questionnaires, the importance behind filling out the questionnaires and that it is not considered as a test and there are no grades on it.

At the same time personal interviews were conducted with teachers and interviews with focus groups of students in order to identify their environmental perceptions and their perceptions regarding environmental programs in two schools, green and non-green.

After distributing the questionnaires, at the beginning of the school year, the intervention program was transferred to teachers in a non-green school (which was chosen from the five schools). The purpose of the intervention program was to expand the environmental knowledge of teachers, guiding them for planning and managing lessons, workshops and environmental projects and indirectly to raise students' environmental literacy. At the end of the school year, the questionnaire was distributed again to all students in the same five schools, including the students in the non-green school in which the intervention program was operated. Students at this school were used as the research group and students in all the other schools were used as a control groups.

Data collection - During the research, data was collected through questionnaires, personal interviews and group interviews (focus groups) with students.

Questionnaires - The questionnaire development procedure: The questionnaire was based on existing research tools, local and international, which are considered as milestones in the field of literacy assessment:

1. CHEAKS questionnaire: Children Environmental Attitude and Knowledge Scale questionnaire, it was developed by Leeming et al [72] and translated into Hebrew and validated by Dori and Tal [30].

2. Questionnaire OF Tal and colleagues that assesses the impact of EE activities on knowledge, environmental awareness and behavior of students in primary schools [157].

3. Environmental Literacy Questionnaire of Negev and colleagues, used in the field of EE researches that examined the level of environmental literacy of students in schools [101].

Validation of the content and the structure of the questionnaire in Arabic was achieved by, first, transferring the questionnaire among a pilot population of 32 students and then analyzing and identifying the categories concerning the research questions and at the end reformulation of the questionnaire. Which means that the questionnaire had two versions of processing as well as a linguistic proofreading and editing in Arabic language by a specialist teacher in Arabic language, whose mother tongue is Arabic and who is considered much proficient in Arabic and Hebrew, as well as by specialist teacher in science, whose mother tongue is also Arabic. The two teachers work at the same school. The involvement of teachers in the school, the processing, proofreading and editing the questionnaire increases the validity of the questionnaire because the processing is

done while taking into consideration the specific language culture of the school. The final version of the questionnaire has been read by 5 judges, researchers or experts in the field of EE and the comments were taken into account in the final version. The questionnaires in English is presented in appendix (4).

Reliability: Alpha tests were conducted to the parts of the questionnaire that examine attitudes, affect and behavior, at the beginning and end of the school year. Average of alpha cronbach values: attitudes part ($\alpha=0.87$), affect part ($\alpha=0.86$) and behavior part ($\alpha=0.85$).

Structure of the questionnaire: The questionnaire is anonymous and at its beginning it is written in detail that the data that will be gathered are intended for research purposes only. The questionnaire is divided into six sections and it examines personal information, environmental knowledge, attitudes on environmental issues, environmental affect, environmental behavior and skills. In addition, it examines environmental awareness (of environmental problems). The questionnaire contains multiple-choice questions, questions of Likert scale type and open questions.

The students were asked to answer the questionnaire at two planned time points: at the first month of the school year and at the last month of the school year.

The questionnaire is divided as follows:

- Background information that are appropriate for the purposes of the research: gender, age, school, religion, residence, father's work, mother's work, time spent in nature and concern for nature. In addition, six questions about environmental awareness were added to the first part according to Likert scale built out of five degrees when 1 means "not at all" and 5 means "to a very large extent". (information about parents' education was taken from school).

- Environmental knowledge: This section is divided into 27 multiple-choice questions that examine ecological knowledge (understanding processes and factual knowledge), environmental knowledge (Understanding processes in the field of environment and knowledge about the impact of everyday behavior) and local knowledge (basic factual knowledge and factual knowledge on human resources management).

- Environmental attitudes, concern for the environment and willingness to act: This section is composed of a questionnaire according to Likert scale with five degrees when one means "do not agree at all" and 5 means "strongly agree". The questionnaire includes 30 statements. Some of the statements were written in the negative form in order to test consistency in the responses. The statements examine the issues: Nature and environment,

Preservation against development, the relationship between human and environment, consumption, personal responsibility and the ability to change, environmental policy and environmental problems.

- Environmental affect: This part is composed of a questionnaire according to Likert scale with five degrees where 1 means "strongly disagree" and 5 means "strongly agree". The questionnaire includes 14 statements and examines how students feel about the environment: love, hate, joy, sadness, anger and fear of environmental interests.

- Environmental behavior: This section is composed of a questionnaire according to Likert scale with five degrees when 1 means "never" and 5 means "always". This questionnaire contains 18 different actions that are directly or indirectly related to the field of environmental behavior in the field of saving resources and recycling, friendly consumption for the environment, leisure and environment and environmental action. In addition, the students were asked to answer a question that requires them to indicate the source of their knowledge.

- Skills: This section includes questions that were designed to test understanding and high-order cognitive knowledge such as identifying environmental problem and proposing solution to the problem and also to test environmental awareness concerning environmental problems. (the teacher who was present in the class during passing the questionnaire was asked to read this section to all students in the class in order to consider students with reading difficulties that might not be able to read but can deal with the questions). Below, table 3.5 presents the structure of the questionnaire.

Table 3.5 – The pre and post questionnaire's structure

Questionnaire's parts	Part A	Part B	Part C	Part D	Part E	Part F
What was tested?	background information	environmental knowledge	Environmental attitudes / willingness to act	Environmental affect	Environmental behavior	Environmental skills: the ability to identify problems and propose solutions
Type of questions	Closed Likert type	Closed multiple choice	closed Likert type	Closed Likert type	closed Likert type	opened
Source	Developed for the research	Developed for the research	Developed for the research	Developed for the research	Developed for the research	Developed for the research

Personal interviews - The interviews have provided information in order to answer the second research question. The interviews are a major research tool that were designed to deepen and broaden the understanding of the data obtained from the questionnaires. The interviews that were conducted in this research were private and semi-structured according to the principles of [39]. The questions were prepared in advance and were used as a basis for the dialogue between the researcher and the interviewees. All interviews were conducted face to face and were recorded on tape. At the beginning of the school year, four interviews were conducted with teachers in a green school and four others were conducted with teachers in a non-green school. At the end of the year, four interviews were conducted with the same teachers in the non-green school. The purpose of the interviews that were conducted at the beginning of the school year and lasted about 45 minutes was to understand the teachers' environmental perceptions, their perceptions regarding goals, effectiveness and contribution of the environmental programs, the environmental awareness and action of teachers and students at school. The purpose of the interviews carried out at the end of the year and lasted for 45 minutes was to find out whether the intervention program objectives were realized in relation to expectations, was there a gap between the expectations, world perception, programming and implementation of the program, whether the program was adapted to school and teachers and whether the program was effective.

While analyzing the interviews several categories were identified according to literature in an inductive way. The categories were transferred to two other scholars who read them and refined them until the final categories were accepted and in this way the interviews were validated in the research.

The final categories that received a consent at the end were: in the pre-interviews: environmental perceptions of teachers, perceptions regarding the environmental programs, perceptions regarding the expectations from the program, perceptions regarding the contribution of the program, perceptions regarding the level of environmental awareness of teachers and students, perceptions of the level of environmental activity of teachers and students, perceptions regarding the environmental problems and recognizing environmental associations. in the post interviews: perceptions regarding the goals of the intervention program and its contribution and effectiveness. The questions of the personal interview with teachers are listed in Appendix (5).

Focus groups - This research tool is defined as a type of group interview [39; 110] with the help of focus groups. Using focus groups help us to collect information that cannot be reached in other ways, to get a variety of responses, to view multiple interactions, to enrich the information collected by other tools and there for it is a better basis for the research [19; 39; 88; 91]. Focus groups

can be used as an assessment tool or to identify students' perceptions and their impression of programs that they took part in it and to assist in diagnosing the difficulties and the problems during the programs implementation. The focus groups in this current research were used to collect data from students in order to answer the second research question.

In this current research interviews were conducted for six focus groups: four groups at the beginning of the school year and two at the end of the school year. The interviews were conducted within the school, inside the classrooms as part of a normal school day in the presence of all the students for an hour and a half. Before starting the interview the students received a brief explanation about the purpose of the research, the purpose of the group interview and that participating in an interview is an optional matter and students can retire whenever they want.

At the beginning of the school year two interviews were conducted in a non-green school, which has not environmental programs running into it, and was attended by 24 + 27 students, and two interviews in a green school, in which the "green school" program was running into it, and was attended by 26 + 27 students.

At the end of the school year two interviews were conducted in the non-green school, in which the intervention program was transferred, and was attended by 28 + 25 students. Total of students who participated in all six focus groups was 162 students. Number of focus groups and students are listed below (table 3.6).

Table 3.6 - Number of focus groups and students who participated in the focus groups

	Focus groups In non-green school	Focus groups In green school
At the beginning of the school year	• 27 students • 24 students Total 51 students	• 27 students • 26 students Total 53 students
At the end of the school year	• 25 students • 28 students Total 53 students	

Content validation of the interview questions of the focus groups was done by two teachers who are experts in science education. They examined the suitability between the interview questions and the research questions until they reached a consensus.

After analyzing the focus groups, categories were identified and transferred to the same researchers who read the questions. The researchers refined the categories and selected the final

categories: in pre-focus groups: students' environmental perceptions, perceptions concerning the goals of the environmental programs, perceptions of their expectations from the program, perceptions of the program contribution, perceptions of the level of environmental awareness of students, teachers and parents, perceptions of the level of environmental activity of students, teachers and parents, perceptions of students' self-knowledge, perceptions of the students' environmental affect, perceptions of the environmental problems, recognizing green associations and organizations. Pre-focus groups: perceptions regarding the goals of the intervention program and its contribution and effectiveness of the. Questions of the focus group are presented in appendix (6).

Data analysis: The qualitative data was analyzed according to the content analysis method of (Shkedy 2003/2006) and the quantitative data was analyzed in excel software.

The importance of the research - This current research has a theoretical contribution and an applied contribution. Theoretical contribution: According to the literature there are not many studies on examining the effectiveness of EE programs and their impact on its participants, especially in the Arab sector. This research tracks an EE program that takes place along the continuum between formal and informal education and help understanding the impact of the program on participants' perceptions, knowledge, attitudes and behaviors. Applied contribution: The information that will be obtained from this study can be used as a cornerstone in application of EE programs in a formal and informal frames. The findings will help various educational institutions especially in the Arab sector to create programs and implement work patterns and teaching methods in environmental projects. This research suggests to promote EFS in the country, through programs of knowledge, involvement and environmental behavior. Furthering EFS is important to create citizens with responsibility and social caring.

The intervention program - The intervention program was designed by the researcher in accordance with the data received from the pre-questionnaires. The program was activated according to the "learning teachers room" method and sought to raise the level of students' EL. Most of the teachers at school have regularly attended the program. The teachers were asked to integrate EE in all teaching fields. The benefits of the "learning teachers room": the environmental issue is part of the discourse of school. The sense of partnership of all teachers also contributes to the climate in the teachers room. When all the teachers affiliate, we can get the best from the different skills and the various abilities of the staff. The program is the responsibility of all teachers and thus the

accumulated knowledge, the materials that were developed and the accessories that were acquired will remain over the years at school. This way, the results are much more significant over time [134].

Program Description - The intervention program is actually an annual training course, consisted of 14 sessions of two/three teaching hours (total 30 teaching hours). The program included lectures, workshops and tours about environmental issues, in which issues were raised, discussions were conducted, teaching models were taught, work groups were activated, teachers watched films and presented lessons that were delivered or will be delivered according to the teachers' expertise, materials from the teachers experiences were raised and discussions will conducted (presentation and analyzing a case Study). The workshops were supposed to prepare and support teachers in their work practice at school regarding EE [134].

Program background - The EE, through action and actual experience, is the most important tool for behavioral change among the wide population. Teachers audience that are in immediate proximity to the next generation citizens of the country, has a tremendous potential to bring about this change. Each teacher perceives the concept "environment", the implementation and the role of the EE in a different way, that is because he came up with a complex system of knowledge, beliefs, values and perceptions, which he formed during his previous experiences, and it affects the learning process he is experiencing [134].

Perceptions of teachers are very important because they are the key to the implementation of a significant EE in the school system and to the development of EL among students [86]. In addition to knowledge, teachers must provide students with the ability to understand, to review and discuss, equivalently, environmental issues which are scientifically and ethically loaded, and require a comprehensive reference that includes considering ethical, moral, social and cultural considerations. If teachers are lack of knowledge, skills, attitude and commitment to the environment, it is unlikely that they can be used as leaders of environmental change in schools [100]. Empirical evidence suggests, that inadequate EE in teacher education is one of the obstacles to successful implementation of EE in schools [21; 66; 86; 87; 167]. The ways in which people experience the environment and understand it, reflects on their environmental behavior and therefore it is important to decipher these understandings [75]. Teachers' environmental perceptions affect students' environmental perceptions and thus their behavior.

Therefore decoding environmental perceptions of teachers and students will help to achieve the goals of EE because EE is an education for social and environmental change and it directs to behavioral change that leads to environmental responsible behavior. In order to achieve its goals, the

EE must be contextual and based on the ways in which different people perceive their environment, understand it and define their place in it [182]. Identifying ideas and understandings, about the meaning of environment, including decoding students' perceptions, adds an aspect that cannot be revealed in a quantitative investigation of the EL variables (knowledge, attitudes and behavior).

Thus, on the one hand, there is a contribution to the building of more comprehensive and accurate picture about students' EL, which will lead to a significant integration of EE in the curriculum. On the other hand, and because perceptions reflect and clarify the understanding, the analysis of the perceptions may contribute to the development of effective and significant programs and methods of teaching in EE, that extend and deepen these understandings [75; 111; 119]. Most teachers in Arab schools, green and non-green are not exposed or exposed a little to the environmental issue [103]. According to Methany's research [89], in her thesis at Seminar Hakibbutzim, who examined the characteristics of the teachers' environmental attitudes from the Arab sector, the role of EE in their eyes and the links between their environmental attitudes and perception of their role, she came to the conclusion that Arab teachers have attitudes that indicate them as suitable to be used as agents of change in promoting proper ecological attitudes, but perception of their role as active designers of environmental attitudes and behaviors among students is inadequate, most of them see that their educational role as transferors of information of issues related to the common environmental perceptions.

Uniqueness of the program: Teachers are in daily contact with the students and have a great impact on them. Therefore, if the main goal of EE is EL then the EL programs should concentrate mainly on teachers in order to raise the students' EL. This program is unique for Arab schools because it is meant to change the teachers' perceptions regarding their role and to give them the feeling that they can influence the knowledge, attitudes, and behaviors of students concerning the issue "environment". This program is necessary in all the Arab schools that want to combine and to promote EE and raise the level of students' EL in their schools [134]. During this program the teachers were exposed to a challenging, intriguing, relevant and valuable materials that led to the raising of their motivation to learn more about the subject "environment" (meaningful learning). Teachers were very active and developed deep understanding regarding environmental issues. They transferred to the students what they have learned and experienced with them interesting activities regarding environment. Target population: all the teachers at the school in which the intervention program was transferred. Location: Inside the school in which the intervention program was transferred and tours in the area. Time: As part of the meeting hours that were designed for staff

meetings throughout the academic year (after coordination with the Director of the school). The intervention program model is presented below in fig. 3.3.

Program objectives: Providing environmental knowledge about issues relevant to the teachers' fields of work; Getting the best of the different skills and the diverse capabilities of all teachers in the school; Strengthening teachers' environmental perceptions and perceptions about their role as active designers of environmental attitudes and behaviors among students; Encouraging teachers and raising their level of willingness to act with their students for the environment; Sharing all the teachers at school in the environmental program and integration of EE in all fields of study; Expanding the responsibility and deepening the involvement of staff: not to throw the responsibility solely on stakeholders teachers who work sometimes alone without support in actions and also not on the teachers whose teaching fields are significantly more related to environment so that the environmental issue would not receive only a scientific orientation without a wide social-cultural context; Providing a significant interactive teaching model related to EE; Contacting the ongoing learning and the curriculum of the school; and Raising the students' EL level in the school. The emphasis in this program is on experiential and practical learning, and on action for the environment. Topics, objectives, activities, outcomes and duration of the meetings of the intervention program are presented below in table 3.7.
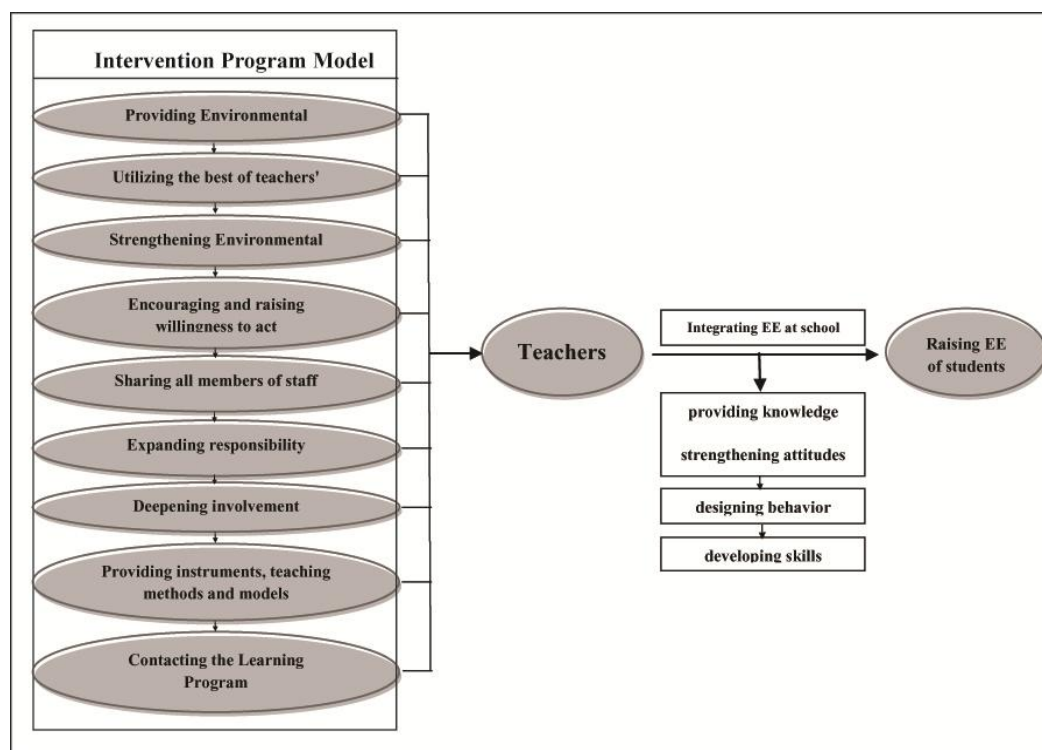
Fig. 3.3. Intervention Program Model

Table 3.7 – Topics, Objectives, Activities, Outcomes and Duration of the Meetings

Meeting number	Topics	Objectives	Activity and Outcomes	Duration
1	Matching expectations and building a contract + recognizing basic concepts in the environment subject	To identify and express, publicly, realistic expectations about the program. To define the rules of conduct expected of the group. To recognize basic concepts in environmental issues.	Working in groups: coordinating and discussing different expectations of participants and creating a basis for decision-making and shared planning of activities. Lecture: recognition of the basic concepts in environmental issues. Product: Contract.	2 hours
2	The environment as a source of knowledge and as a source of personal development + the effect of the natural environment on humans	To learn more about environment and its impact on the person.	Lecture + working in groups Product: painting, model or text under the heading "The perfect environment for us" and presenting it in front of the team.	2 hours
3	The environmental crisis (the human impact on the environment)	To learn more about environment and to focus on human influence on the environment and on the existing environmental problems.	Watching a film + Lecture: Teaching using a presentation. Product: raising teachers' environmental awareness regarding environmental issues.	2 hours
4	Active learning, learning outside of school, learning tour	To be connected to the curriculum. To get the best out of the teachers' skills. To provide a teaching model.	Lecture: frontal teaching using a presentation. Working in groups. Product: subjects and objectives for outdoor lessons and deciding on sites near school to perform the lessons.	3 hours
5	Environmental education in the country and in the world and environmental literacy (background)	To provide knowledge.	Lecture: frontal teaching with the use of the presentation. Product: raising teachers' knowledge regarding environmental education and environmental literacy.	2 hours
6	Approaches in environmental education	To Strengthen teachers' environmental perceptions. To provide Knowledge.	Individual work: Each teacher writes on paper how he perceives the concept environment and then discussing the concepts. Lecture: frontal teaching, using a presentation. Product: teachers are more aware of environmental approaches.	2 hours

7	waste problem and water problem	To provide knowledge. To share the teaching staff and to encourage them to raise the level of willingness to act for the environment along with students.	Lecture: frontal teaching with the use of the presentation. Product: Raising teachers' awareness regarding waste and water problems.	2 hours
8	The problem of waste incineration in the Arab sector	To encourage teachers and to increase their willingness to act for the environment with students.	Watching a film, plenary discussion. Frontal teaching, using a presentation. Product: Raising teachers' awareness regarding waste incineration problem.	2 hours
9	Activating environmental education at school + learning programs and projects in environmental education operated by external bodies	To share all the teaching staff. To expand the responsibility, to deepen the involvement and to connect the curriculum	Frontal teaching, using a presentation. Plenary Discussion. Product: Teachers are more aware of teaching models, environmental programs and green associations.	3 hours
10	Evaluation in environmental education	Deepening and application in the evaluation subject	Frontal teaching, using a presentation. Product: Examination teachers' environmental literacy level	2 hours
11	A tour in a green school, leading in environmental education, in the North of the country	To learn about the theoretical studies held in school. To recognize the action plan in which the school is implementing a sustainable lifestyle. To learn about the methods that the school uses for green visibility. To recognize the environmental projects at school.	Sightseeing. Observations. Lecture and discussion. Product: Examination teachers' environmental literacy level	2 hours
12+13	Integrating the environmental theme in different teaching professions: Presentation of lessons	To contact the curriculum. To provide instructional model.	Presenting Lessons Product: Arrays of lessons relating to environment.	4 hours
14	A concluding tour at the center for research and environmental education in Sakhnin	To give teachers the opportunity to have a practical authentic experience in areas of knowledge such as sewage treatment and improvement of reclaimed water, energy conservation, alternative energy and green building.	Frontal teaching, watching a film and a tour in the center stations. Product: Teachers are more experienced with environmental issues.	2 hours

Before transferring the intervention program, personal interviews were conducted with some of the teachers participating in order to identify their environmental perceptions and their perception regarding the goals and the effectiveness of the environmental program existing at school and after completion of the program, interviews were conducted with the same teachers in order to identify the contribution of the intervention program to their work in environmental issues.

Content of sessions: matching expectations, creating a contract and familiarity with basic concepts in environmental issues; lectures, workshops, individual and group tasks, films, observations and educational tours round the field environment: the environment as a source of knowledge and as a source for personal development and the impact of the natural environment on the person; the environmental crisis (human impact on the environment); active learning, learning outside the school and learning trip; EE in our country and abroad, and EL (historical background); approaches in EE; the waste problem and the water problem; the problem of waste incineration in the Arab sector; activating the EE in the school curriculum and the EE projects operated by outside agencies; evaluation in EE; a tour/visit in a green school, leading in EE, in the North; Presenting Lessons/integrating the environmental theme in different teaching professions; a concluding tour at the center for research and EE in Sakhnin. Detailed content of sessions is presented in appendix (7).

Throughout the program, tools and methods that lead to a significant action, were incorporated in order to create desire and motivation among teachers for performing and implementing the program, and particularly for an active action for the environment.

In summary, this study was designed to evaluate the students' environmental literacy level, as well as to identify environmental perceptions of students and teachers in primary schools of the Arab sector in Israel, while comparing between non-green schools (without environmental programs) and green schools (with environmental programs).

This study focused on an intervention program designed specifically for teachers in order to train them to integrate environmental education in the school. Next part of this chapter focuses on the findings regarding the students' EL levels, the connection between EL and background variables and correlations between EL dimensions.

3.2. Environmental Literacy of students, correlation between components and connection to background variables

This chapter presents the findings of the research about the EL of sixth grade students in primary schools in the Arab sector at the beginning and at the end of the school year in relation to type of school (green school, non-green school, non-green school with intervention program).

EL in this research includes five main dimensions: knowledge, attitudes, affect, behavior and skills. The findings of the skills dimension, which are actually answers of open questions about environmental problems, are also analyzed and presented in this chapter. Correlations between the EL dimensions will be presented at the end of the quantitative analysis part.

In addition to the findings of each one of these five dimensions, the relation to other factors of EL will also be presented: source of knowledge, gender, parents' profession, parents' education level, time spent outdoor.

Environmental knowledge - The environmental knowledge was examined by 27 multi-choice questions. The environmental knowledge includes environmental knowledge (impact and processes), ecological knowledge (factual and processes) and local knowledge (basic, mode and management). It was found that sixth grade students' environmental knowledge in primary schools in the Arab sector is inadequate [138]. There was no significant change in the overall level of knowledge between the beginning and the end of the school year ($p=0.18$, $p>0.05$).

Key findings: Most students know that oil is a source of energy which is decreasing and is not replenished, while solar radiation, wind and plants are renewable energy sources. Most students know that most of the water in nature are saltwater. Most students know that metal drinking cans biodegradable in the slowest rate compared to newspapers, orange peel and tree leaves. Most students know that we cannot recycle disposable diapers but we can recycle paper, aluminum cans and plastic bottles. Most students know that the amount of open spaces in our country today are decreasing because of the increasing number of population. Most students are familiar with the recycling symbol. Most students know that animals which do not exist today are considered extinct. Most students do not know exactly what it is biodiversity. Most students do not know that global warming is mainly due to fuel combustion rather than planting trees, overproduction of light energy or approaching the sun from Earth. Most students do not know that the main problem is that landfills occupy a large area from the ground and not necessarily that they are launching odors, distorted the view, Attract rats and other pests and prevent farming in close areas. Most students do not know that the best friendly way to take shopping home is by using a paper bag. Most of them responded by using thin plastic bags or by baskets or by shopping cart. Only half of the students (40% -68%) answered

correctly the rest of the questions and this indicates that their environmental knowledge is inadequate. The people who answered correctly, know that the main source of energy over the surface of the earth is the sun. They know that environmental science is a field that deals with the relationship between living creatures and their environment. They know that the ozone hole is a big environmental problem because it causes to the penetrating of harmful solar radiation to the earth. They know that most of the gardens trash and the food scraps are recycled into compost. They know that home quiver that cannot be recycled is taken to landfills. They know that burning fuels cause an environmental problem because they emit carbon dioxide and other toxic gases into the air. They know that most of the water in the country is used today in homes and cities. They know that the biggest air polluter in the country is the gases emitted from means of transportation. They know that plastic bottles after they are put in the recycling machine they are cut into small pieces in order to produce from them different products. They know that deforestation could cause global warming. They know that the use of solar water heater on the roof is superior because it conserves power, the light turns into heat which is used to heat the water. They know that the private car is the most harmful to the environment. They know that animals could become extinct because their natural environment in which they live is destroyed. They know that invasive animals are animals that cause great harm to the environment if they spread. They know that wild animals in the country are at risk today because of the construction that reduces the territories suitable for their lives. They know that the society for the protection of nature (SPNI) is a body that works for the development and protection of the environment and for education for quality. According to the findings, it is clear that the questions that were answered correctly by the greatest number of students are: most of the water in nature are saline, disposable diapers cannot be recycled while paper, plastic bottles and aluminum cans can be recycled, and open areas in the country are gradually decreasing due to the increase in population. This matter is encouraging because these issues are also related to scientific knowledge, environmental awareness and consumption. It was found that there is a significant difference between the environmental knowledge of green schools and non-green schools at the beginning and at the end of the school year (p=0.004, p=0.043, p<0.05). Fig. 3.4 presents the environmental knowledge of green schools at the beginning and at the end of the school year and fig. 3.5 presents the environmental knowledge of non-green schools at the beginning and at the end of the school year.
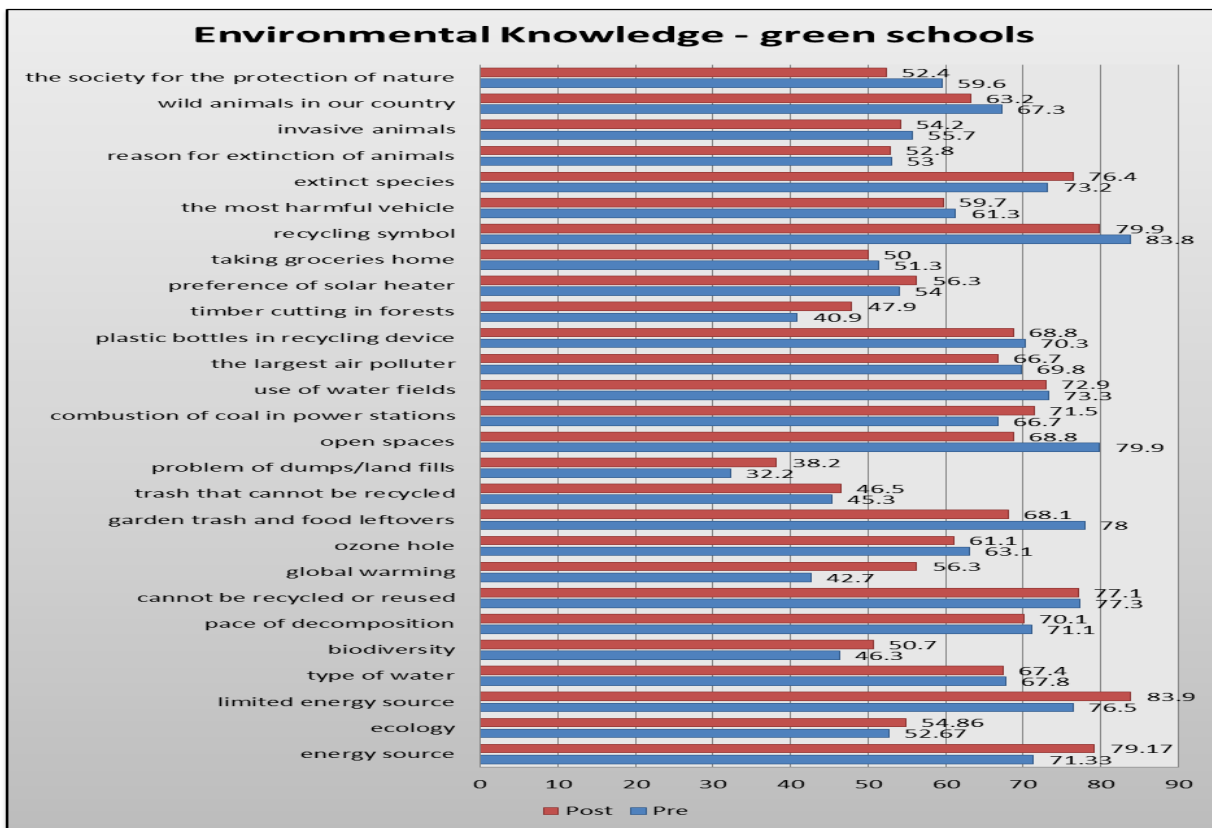
Fig - 3.4 Environmental knowledge of green schools at the beginning and at the end of the school year
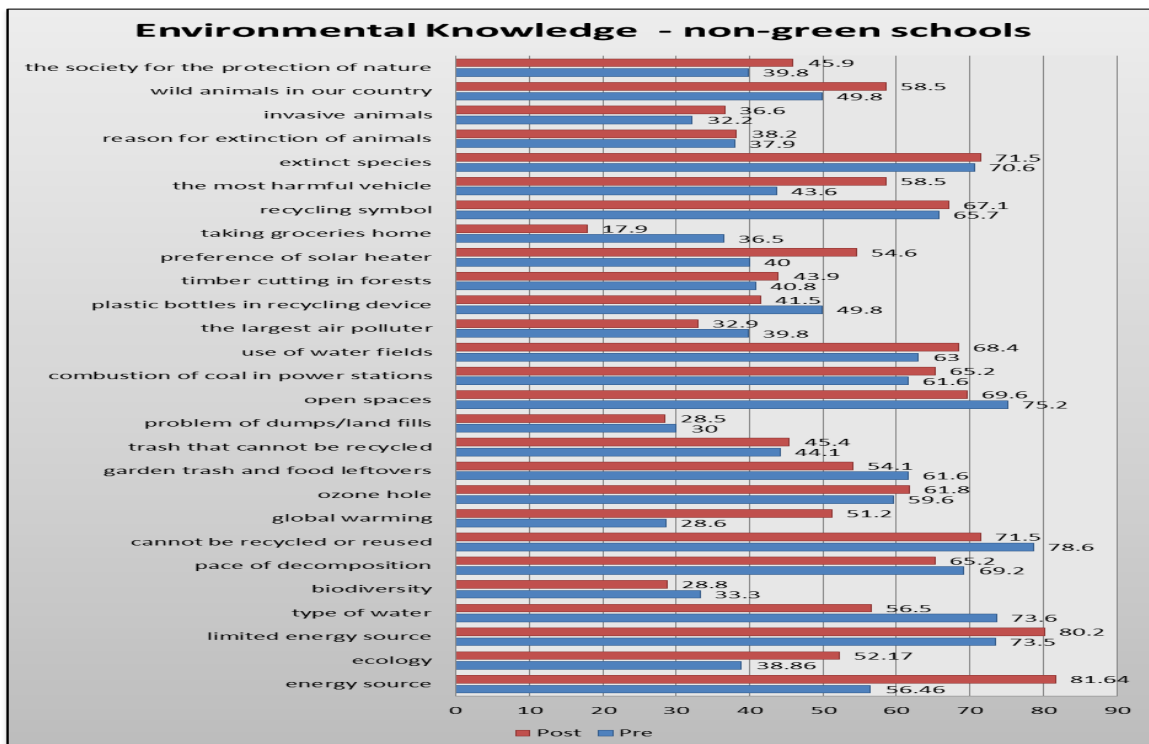

Fig. 3.5 - Environmental knowledge of non-green schools at the beginning and at the end of the school year

Students in green schools knew better to answer almost most questions. There were questions that had no differences between the green schools and non-green schools such as the questions on most of the water in nature, the product that decompose in the slowest rate, the product that cannot be recycled, where is the home quiver, that cannot be recycled, taken, the main problem in landfills, the impact of deforestation on global warming and endangered species.

The percentage of correct answers to the questions on the subjects of biodiversity, global warming cause, the main problem in landfills and the impact of deforestation, was relatively low in both types of schools. The results were similar at the end of the school year. A difference was still found between non-green schools and green schools. Although the difference was little but still significant. The difference was obvious regarding the questions about biodiversity, the product that decomposes at the slowest rate, the largest polluter of the air, the way plastic bottles are recycled, the impact of deforestation, the most friendly way in which shopping is taken home, the symbol of recycling, the reason that animals today could become extinct and understanding the concept "invasive animals".

No change was found in the level of knowledge in non-green and in green schools at the beginning and at the end of the school year which means during the time passed there was no improvement in the level of knowledge in both types of schools but also there was not a decrease in the level of knowledge (p=0.356, p=0.1655, p>0.05).

Regarding the non-green school in which the intervention program was transferred, the environmental knowledge level measured at the beginning of the year was flawed and inadequate in general. Compared to the rest of the non-green schools there was no big difference at the beginning of the school year (p=0.0271, p>0.05) but the level of environmental knowledge in this school was the lowest. The questions that were answered right by the largest number of students were the questions about the limited energy source that may have ended, the product that cannot be recycled and the endangered species. There were several questions that the percentage of students who answered them correctly was greater than other schools, for example, the questions about the main energy source above the planet, the meaning of the concept environmental science, the limited energy source that may have ended, biodiversity, the cause of global warming, the main problem in landfills, the most friendly in which shopping is taken from the store, transportation as the most damaging to the environment and the meaning of the concept of invasive species. But in all these questions, the percentage of correct answers was very low except those about limited energy source that could end,

the product that cannot be recycled, the amount of open spaces in the country, the symbol of recycling and the endangered species. In these questions the percentage of correct answers was acceptable.

While comparing between the school in which the intervention program was transferred and the green schools at the beginning of the school year, it has been found that there was a significant difference ($p=0.0004$, $p<0.05$). The percentage of students who answered the questions correctly was greater in the green schools in all questions. In several questions, the difference between the green schools and the non-green school in which the intervention program was transferred, was very large, such as in the questions about the garden waste and food scraps that are recycled into compost, the largest polluter of the air, the way in which plastic bottles are recycled, the advantage of using solar water heater, the symbol of recycling, the situation of wild animals in the country and the role of the Society for the Protection of Nature.

The situation at the end of the school year, and after transferring the intervention program at the school, is not the same at all.

While comparing between the non-green school with the intervention program and the rest of the non-green schools, there has been found a significant difference ($p=0.0100$, $p<0.05$) in favor of the school with intervention program. The average score of all questions was higher and sometimes with a big difference. It was found that the level of environmental knowledge has increased from 49% to 63% and this is a significant increase. However, the level of environmental knowledge of the other schools was hardly changed and what was prominent is that in some there was an increase but in others there was a decrease, versus the beginning of the school year. This indicates that the environmental knowledge on several topics was not internalized. Fig. 3.6 presents the environmental knowledge of non-green school with intervention program at the beginning and at the end of the school year.

However, while comparing between the non-green school with the intervention program and the green schools, the knowledge level was almost equal with no significant difference ($p=0.3846$, $p>0.05$). In several questions the score in the non-green school with the intervention program was higher but in a small percentage, but what was prominent that in one question the students' score was 90% and this a score that students didn't receive neither in non-green schools nor in green schools, not at the beginning of the school year and not at the end. The subject of the question was that animals that do not exist anymore, are considered extinct animals.

Environmental Knowledge – non-green school with intervention program

Category	Pre	Post
the society for the protection of nature	35.6	56.3
wild animals in our country	39.7	57.7
invasive animals	40.8	47
reason for extinction of animals	38.4	45.1
extinct species	69.9	90.1
the most harmful vehicle	46.6	69
recycling symbol	65.8	80.3
taking groceries home	41.1	42.3
preference of solar heater	34.2	67.6
timber cutting in forests	34.2	56.5
plastic bottles in recycling device	49.3	63.4
the largest air polluter	21.9	53.5
use of water fields	57.5	80
combustion of coal in power stations	58.9	70.4
open spaces	65.3	80.3
problem of dumps/land fills	34.2	45.1
trash that cannot be recycled	37	56.3
garden trash and food leftovers	38.4	56.3
ozone hole	51.4	63.4
global warming	39.7	50.7
cannot be recycled or reused	75	77.5
pace of decomposition	60.3	80.3
biodiversity	47.9	42
type of water	59.7	63.4
limited energy source	76.7	87.3
ecology	43.84	53.52
energy source	62.5	88.73

Fig. 3.6 - The environmental knowledge of the non-green school with intervention program at the beginning and at the end of the school year

Although the equality between the non-green school with the intervention program and the green schools at the end of the school year, the overall level of knowledge is still inadequate in both types of school. Differences between the groups are presented below, table 3.8.

Table 3.8 - Differences in knowledge between the groups that participated in the research

Groups	Level of significance (p)	Difference
All schools-Pre/All schools-Post	0.1889	not significant
Non-green school with intervention program-Pre/ Non-green school with intervention program-Post	0.0000000038	significant
Green schools-Pre/Green schools-Post	0.3567	not significant
Non-green schools-Pre/Non-green schools-Post	0.1655	not significant
Green schools Pre/Non-green schools Pre	0.0048	significant
Green schools Post/Non-green schools Post	0.0435	significant
Non-green school with intervention program-Pre/ Green schools-Pre	0.0004	significant
Non-green school with intervention program-Pre/ Non-green schools-Pre	0.2710	not significant
Non-green school with intervention program-Post/ Green schools-Post	0.3846	not significant
Non-green school with intervention program-Post/ Non-green schools-Post	0.010	significant

(Pre: at the beginning of the school year, Post: at the end of the school year). (significant: p less or equal 0.05, not significant: p more than 0.05).

Environmental attitudes - Environmental attitudes and willingness to act for the environment were examined by questions according to Likert scale, divided from 1 to 5 which express varying degrees of polarization in an axis ranging from full agreement to a complete disagreement (1-strongly disagree, 2 disagree, agree to some extent 3, 4 agree, 5 strongly agree). Students were asked to answer 30 questions. It was found that in most areas, the attitudes toward the environment were generally positive among students from non-green schools and among students from green schools.

It should be noted that the attitudes in green schools were a little more positive than the attitudes in non-green schools at the beginning of academic year and at the end of the year in a very small percentage but with no significant difference [138]. Fig. 3.7 presents the environmental attitudes of green schools at the beginning and at the end of the school year and fig. 3.8 presents the environmental attitudes of non-green schools at the beginning and at the end of the school year.

Attitudes of students in non-green school with intervention program were almost equal with the attitudes of students in the other non-green schools (p=0.4966, p>0.05) and a little less positive than the attitudes of students in green schools (p=0.1245, p>0.05) at the beginning of the school year. A similar result was also found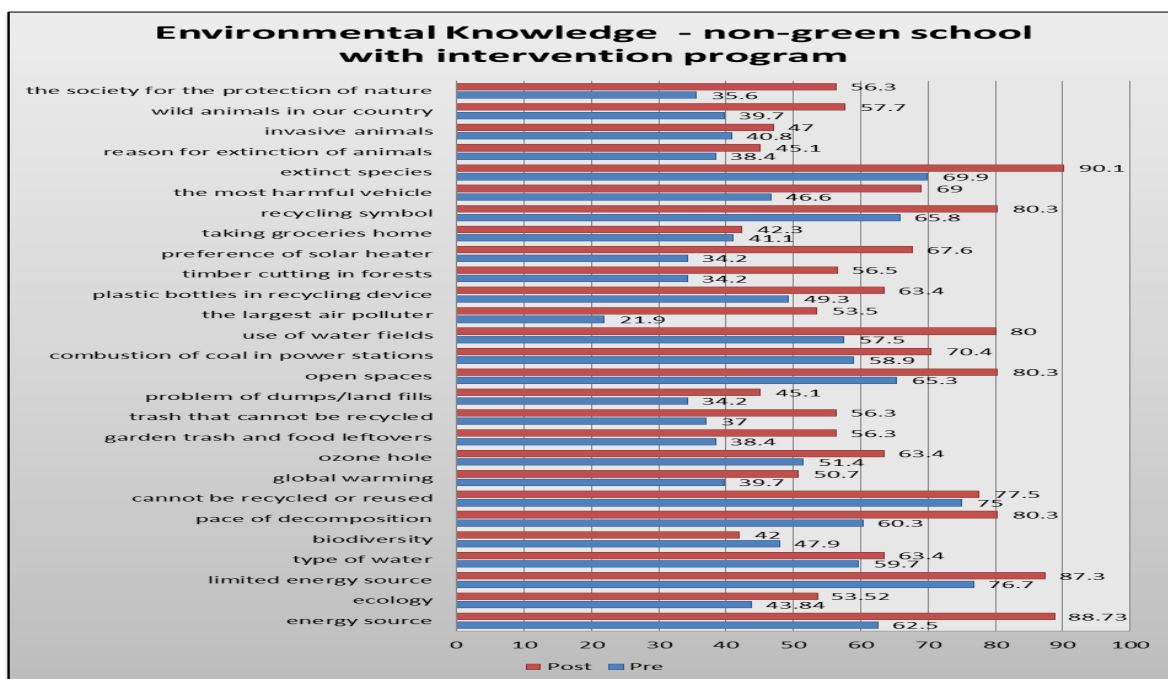 at the end of the school year (p=0.4959, p=0.2926, p>0.05). Fig. 3.9 presents the environmental knowledge of non-green school with intervention program at the beginning and at the end of the school year.

No significant improvement was found in the environmental attitudes during the school year of all students in the green and the non-green schools. As for the school in which the intervention program was transferred, the improvement was not significant at all (p=0.1321, p>0.05). It is worth noting that the strength of identification with some statements was relatively small in general for all students and especially non-green schools at the beginning of the school year.

The little identification intensity was prominent in statements that focused in the importance of protecting the animals and plants, the exaggeration in concerning for the environmental problems, the need to reduce fuel consumption, the need to do something about the dirt in streets, family readiness to separate waste for recycling and the readiness to go from house to house and convince people to recycle garbage.

In general the most positive attitudes were found in the items that focus on the importance of protecting the environment, punishing individuals for causing damages to the environment and the importance of public parks and open spaces within communities.

In green schools the positive attitudes were found in the same items as well as in the items that focused on water pollution, which is considered bad even if it is not harmful to human as it is harmful to

animals and plants, and the readiness to donate money to protect animals and plants in the wild. A similar matter was found in non-green schools and also in the non-green school with the intervention program in which more positive attitudes were been prominent in the item that focuses on that the environment should occupy more important position in the priorities for the country. The differences in attitudes between the groups that participated in the research are presented in table 3.9.

Fig. 3.7 - Environmental attitudes of green schools at the beginning and at the end of the school year

Fig. 3.8 - Environmental attitudes of non-green schools at the beginning and at the end of the school year

Fig. 3.9 - Environmental attitudes of non-green school with intervention program at the beginning and at the end of the school year

Table 3.9 - Differences in attitudes between the groups that participated in the research

Groups	Level of significance (p)	Difference
All schools-Pre/All schools-Post	0.3615	not significant
Non-green school with intervention program-Pre/ Non-green school with intervention program-Post	0.1321	not significant
Green schools-Pre/Green schools-Post	0.3805	not significant
Non-green schools-Pre/Non-green schools-Post	0.1286	not significant
Green schools Pre/Non-green schools Pre	0.0863	not significant
Green schools Post/Non-green schools Post	0.2726	not significant
Non-green school with intervention program-Pre/ Green schools-Pre	0.1245	not significant
Non-green school with intervention program-Pre/ Non-green schools-Pre	0.4966	not significant
Non-green school with intervention program-Post/ Green schools-Post	0.2926	not significant
Non-green school with intervention program-Post/ Non-green schools-Post	0.4959	not significant

(Pre: at the beginning of the school year, Post: at the end of the school year). (significant: p less or equal 0.05, not significant: p more than 0.05).

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Environmental Affect - Environmental affect was examined by questions according to Likert scale divided from 1 to 5 that express different degrees of polarization in an axis ranging from full agreement to a complete disagreement (1-strongly disagree, 2 disagree, agree to some extent 3, 4-agree, 5 strongly agree). Students were asked to answer 14 questions in this part. It was found that environmental affect is generally positive (average above 3.5) [138]. There was an increase in in the level of affect in all types of schools at the end of the school year comparing to the beginning of the school year (p=0.0001, p<0.05).

It is worth mentioning that there was an improving in the affect during the school year among students in green schools and among students in non-green schools. There was no significant difference in the environmental affect of students in green schools (p=0.0685, p>0.05) between the beginning and the end of the school year but there was a significant difference in the environmental affect of students in non-green schools (p=0.0003, p<0.005) between the beginning and the end of the school year. Which means that the increase in the level of the environmental affect is not only as a result of the green school program, it could be as a result of the regular teaching program or as a result of the students' maturation. The statements about loving animals, plants and nature were more prominent in green schools rather than in non-green schools. Below, fig. 3.10 presents the environmental affect of non-green schools at the beginning and at the end of the school year and fig. 3.11 presents the environmental affect of green schools at the beginning and at the end of the school year.
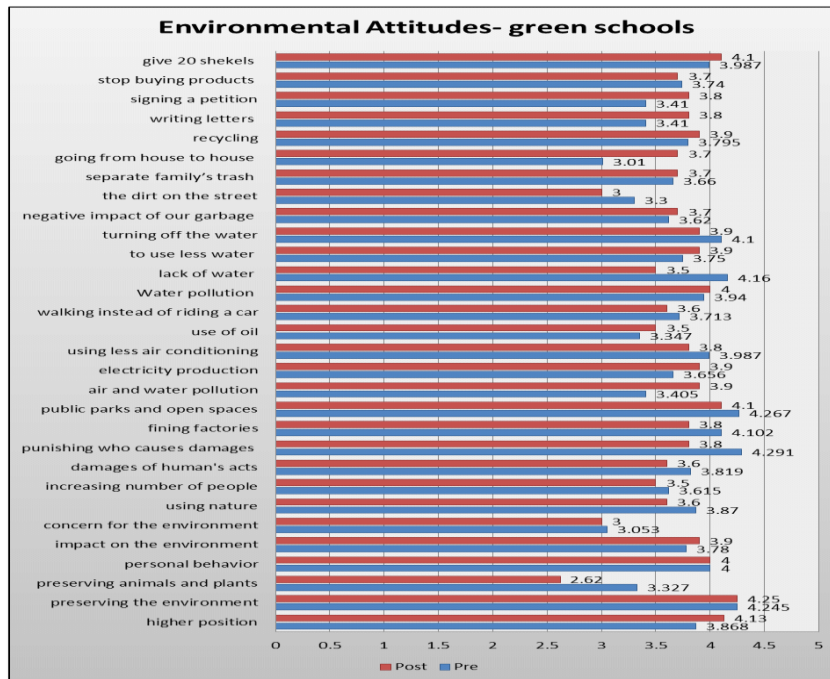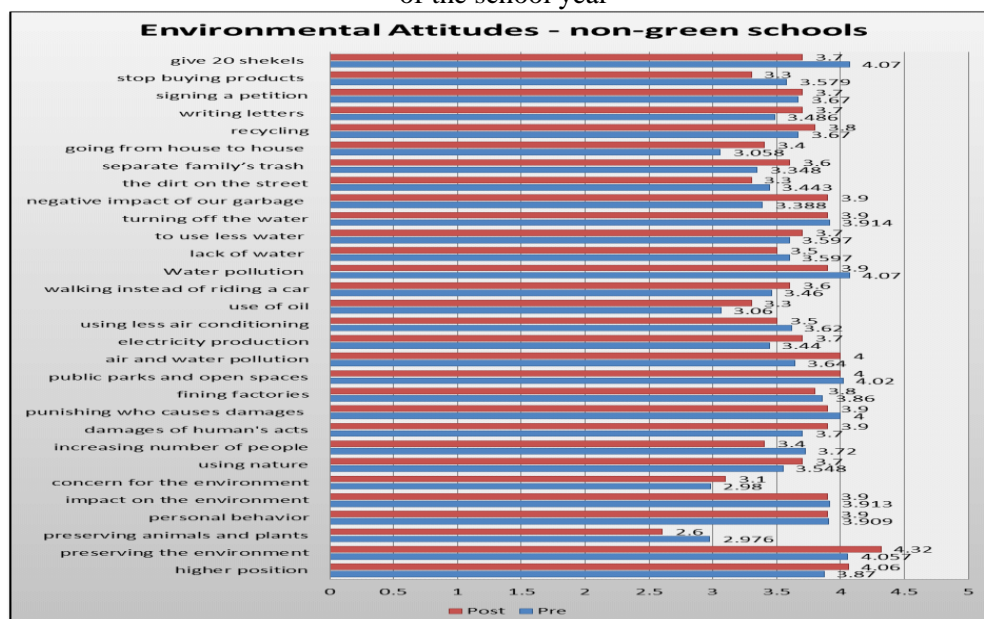

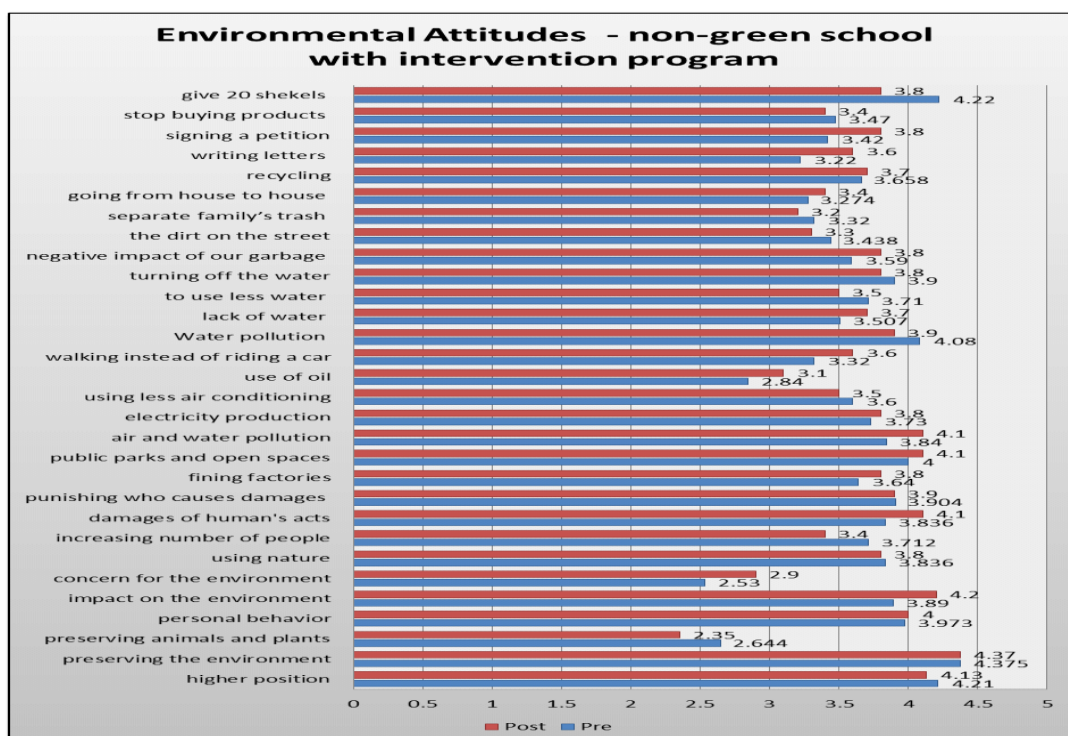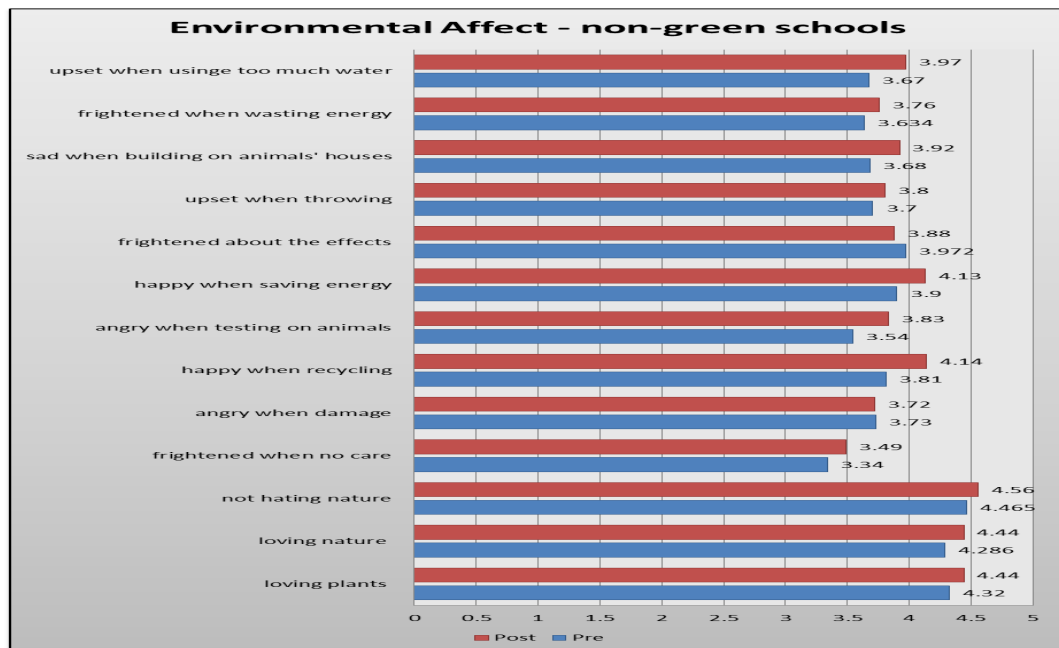Fig. 3.10 - Environmental affect of non-green schools at the beginning and at the end of the school year
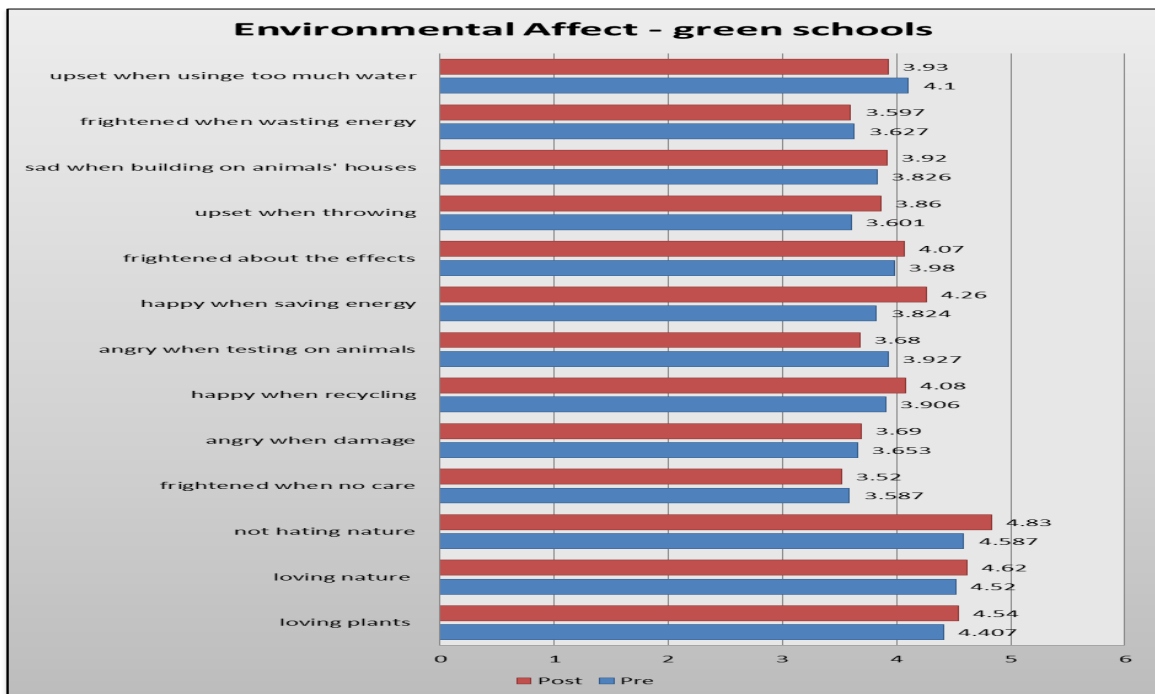
Fig. 3.11 - Environmental affect of green schools at the beginning and at the end of the school year

There was a significant difference in the level of affect of the non-green school with the intervention program, between the beginning and the end of the school year (p=0.0018, p<0.05). It is likely to assume that this difference occurred as a result of the intervention program.

The difference in the level of environmental affect between the non-green school with the intervention program and the other schools was not significant at all at the beginning (p=0.2344, p=0.4428, p>0.05) and at the end of the school year (p=0.4820, p=0.3740, p>0.05). Fig. 3.12 presents the environmental affect of non-green school with intervention program at the beginning and at end of the school year.

The highest score, in all schools, was conspicuous in statements 1, 2, and 3 that focused on the subject of loving of animals, plants and nature. And in a little bit lower level, the statements 6, 8, and 9 that focused on anger about the damage done to the environment as a result of the infection, the experiments that researches do on animals to test the success of certain products, and joy when you see people trying to save energy. The statement that had the lowest score was the fourth statement, which was a reversal statement to the third statement, that expresses hate for nature. The other statements had scores ranging from 3.5 to 4.62 out of 5. Differences in affect between the groups are presented below in table 3.10.

100
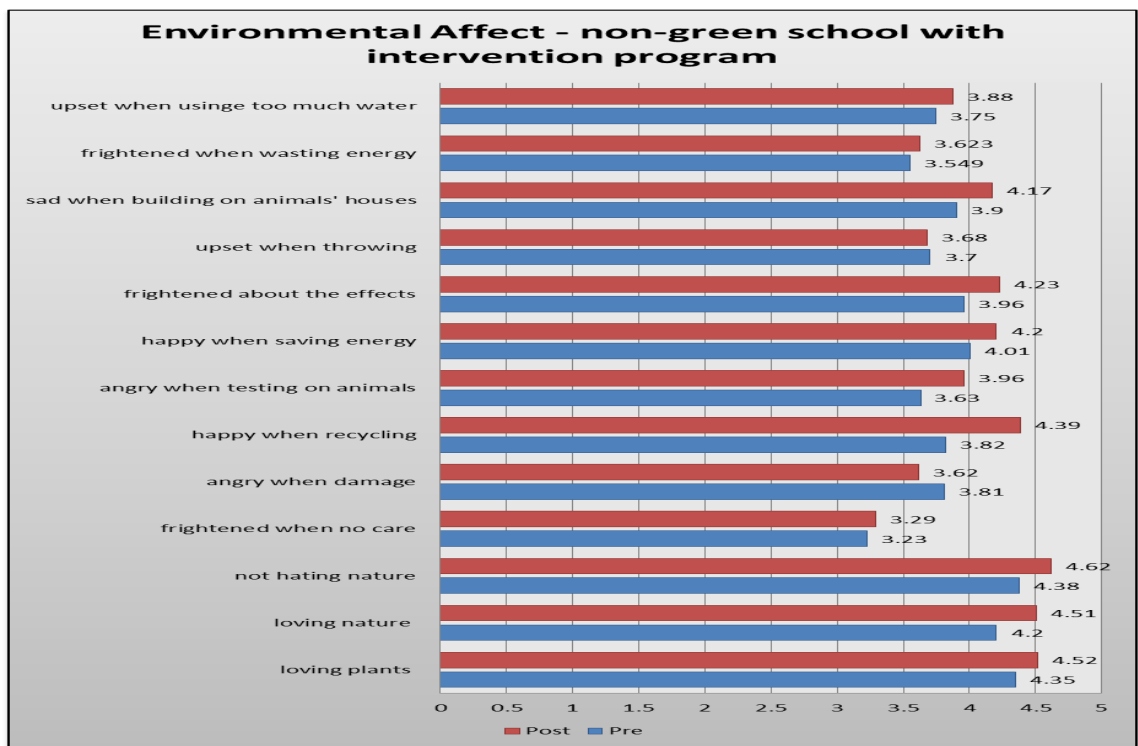
Fig. 3.12 - Environmental affect of non-green school with intervention program at the beginning and at end of the school year

Table 3.10 - Differences in affect between the groups that participated in the research

Groups	Level of significance (p)	Difference
All schools-Pre/All schools-Post	0.0001	significant
Non-green school with intervention program-Pre/ Non-green school with intervention program-Post	0.0018	significant
Green schools-Pre/Green schools-Post	0.0685	not significant
Non-green schools-Pre/Non-green schools-Post	0.0003	significant
Green schools Pre/Non-green schools Pre	0.1969	not significant
Green schools Post/Non-green schools Post	0.3929	not significant
Non-green school with intervention program-Pre/ Green schools-Pre	0.2344	not significant
Non-green school with intervention program-Pre/ Non-green schools-Pre	0.4428	not significant
Non-green school with intervention program-Post/ Green schools-Post	0.4820	not significant
Non-green school with intervention program-Post/ Non-green schools-Post	0.3740	not significant

(Pre: at the beginning of the school year, Post: at the end of the school year). (significant: p less or equal 0.05, not significant: p more than 0.05).

Environmental behavior - The students' environmental behavior was measured through 18 statements according to Likert scale divided from 1 to 5, expressing different degrees of polarization in an axis ranging from performing certain actions "always" and "never" (1-never, 2-rarely, 3-sometimes, 4-most of the times, 5-always). The environmental behavior includes saving resources and behavior for and in the environment.

It was found that in most fields, in all schools, the level of environmental behavior is low and in few fields the level was a little bit higher and is considered acceptable [138]. Key findings: There is no significant difference in the environmental behavior of all students in all types of schools between the beginning and the end of the school year ($p=0.1008$, $p>0.05$). There has been very little improvement in the environmental behavior of green schools but not significant ($p=0.0531$, $p>0.05$). Regarding the non-green schools the difference was not significant ($p=0.4013$, $p>0.05$). There wasn't found differences between the green and the non-green schools neither at the beginning of the school year ($p=0.4567$, $p>0.05$) nor at the end ($p=0.1211$, $p>0.05$) of the school year. According to questionnaire's results that was transferred at the beginning and the end of the school year, most of the students watch programs about the environment, ask their parents to reduce buying packaged products, spend a lot along with the family away from home, close the tap when brushing teeth, open the tap only when needed and turn off the air conditioner When they go out. Fig. 3.13 presents the environmental behavior of green schools at the beginning and at the end of the school year and fig. 3.14 presents the environmental behavior of non-green schools at the beginning and at the end of the school year.

Green schools reported that most of them read information about environment from various sources, they watch television programs relating to the environment, they have fun with their families when they are away from home, they take a shower quickly to save water, they close the tap when they brush their teeth, they open the tap only when needed and they turn off the air conditioner and the lights before leaving the house, which means the behavior in green schools covers more fields.

Students in non-green schools also reported that most of them watch television programs about the environment, they have fun with their families when they are away from home, they close the tap while they brush their teeth, they turn on the tap the water only when needed and they turn off the air conditioner and the lights before leaving home, but in a little bit lower level than students in green schools. In other fields and in all types of schools, at the beginning and at the end of the school year, the level of behavior was low, especially in the fields where students discuss with friends and family issues related to the environment, ask parents to reduce buying packaged products, ask parents to recycle, give notes to those who cause dirt, inform the municipality when encountering an environmental hazard, leave the door of the

refrigerator closed when thinking what to take out of it, take the food to the school in a box, bring to school recyclable materials, use rechargeable batteries and prefer to walk rather than to be taken in a car to close places. Students in the non-green school with the intervention program, reported about a satisfactory level of environmental behavior in the same fields and in a little bit higher level than the other schools, at the beginning of the school year, before transferring the intervention program, and at the end of it. There was no significant difference in the level of behavior of the students in the non-green school with the intervention program between the beginning and the end of the school year (p=0.2901, p>0.05). It is difficult to conclude that the intervention program is the only factor that affects the behavior because the results were similar to the results at the beginning of the school year, before transferring the intervention program, and because the difference in score between the school and the rest of the school is very small. Fig. 3.15 presents the environmental behavior of non-green school with intervention program at the beginning and at the end of the school year. The differences in behavior between the groups that participated in the research are presented in table 3.11.

Table 3.11 - Differences in behavior between the groups that participated in the research

Groups	Level of significance (p)	Difference
All schools-Pre/All schools-Post	0.1008	not significant
Non-green school with intervention program-Pre/ Non-green school with intervention program-Post	0.2901	not significant
Green schools-Pre/Green schools-Post	0.0531	not significant
Non-green schools-Pre/Non-green schools-Post	0.4013	not significant
Green schools Pre/Non-green schools Pre	0.4567	not significant
Green schools Post/Non-green schools Post	0.1211	not significant
Non-green school with intervention program-Pre/ Green schools-Pre	0.2245	not significant
Non-green school with intervention program-Pre/ Non-green schools-Pre	0.3181	not significant
Non-green school with intervention program-Post/ Green schools-Post	0.2584	not significant
Non-green school with intervention program-Post/ Non-green schools-Post	0.3740	not significant

(Pre: at the beginning of the school year, Post: at the end of the school year). (significant: p less or equal 0.05, not significant: p more than 0.05).

According to the standard deviation, the diversity among students was the greatest in the dimension of knowledge, at the beginning and at the end of the school year. It means that the level of

knowledge of some students was much higher than the average and for others was much lower than the average but the level of most students was relatively low and insufficient.

As for the school with the intervention program, the level of knowledge of all students has increased but the diversity between them was the same which means that the students' level of knowledge has increased, but the variance between them remained.

This indicates that the intervention program had a positive impact on the knowledge component but the differences between the students could be also due to the heterogeneous composition of the students in the class.

Regarding the other dimensions of the EL, the attitudes, the affect and the behavior, the scores of the majority of students, from all types of schools, were more or less identical which means with a deviation lower than the average. Scores average of attitudes was 72% -75%, scores average of affect was 76% -81% and scores average of behavior was 66% -70%. Scores in knowledge, attitudes, affect and behavior at the beginning and the end of the school year are presented in table 3.12 and 3.13.
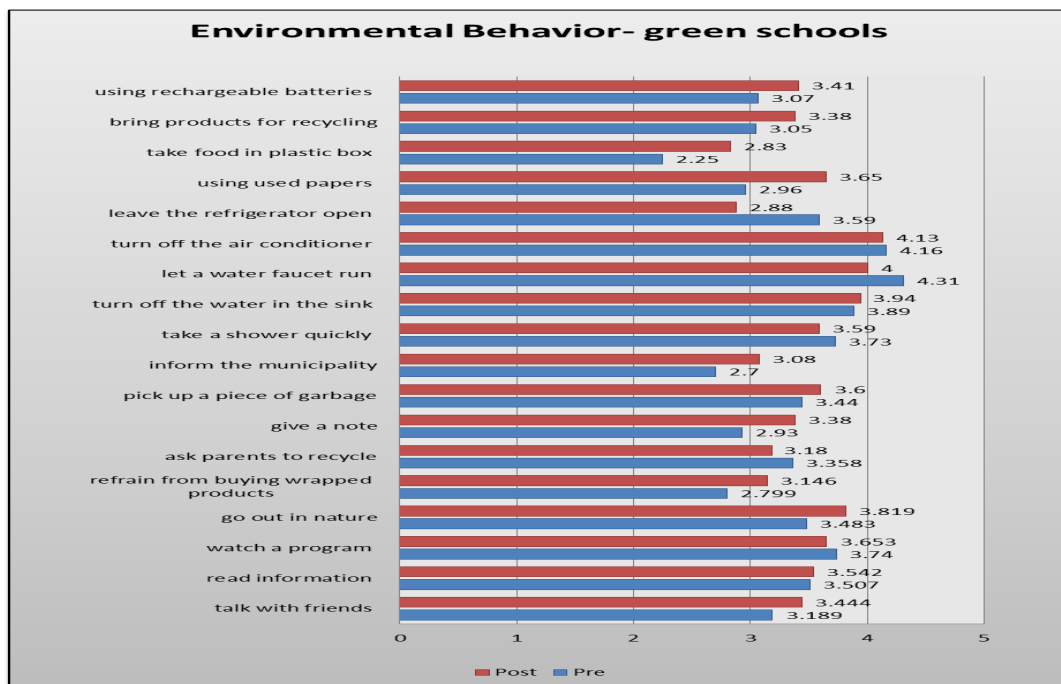

Fig. 3.13 - Environmental behavior of green schools at the beginning and at the end of the school year
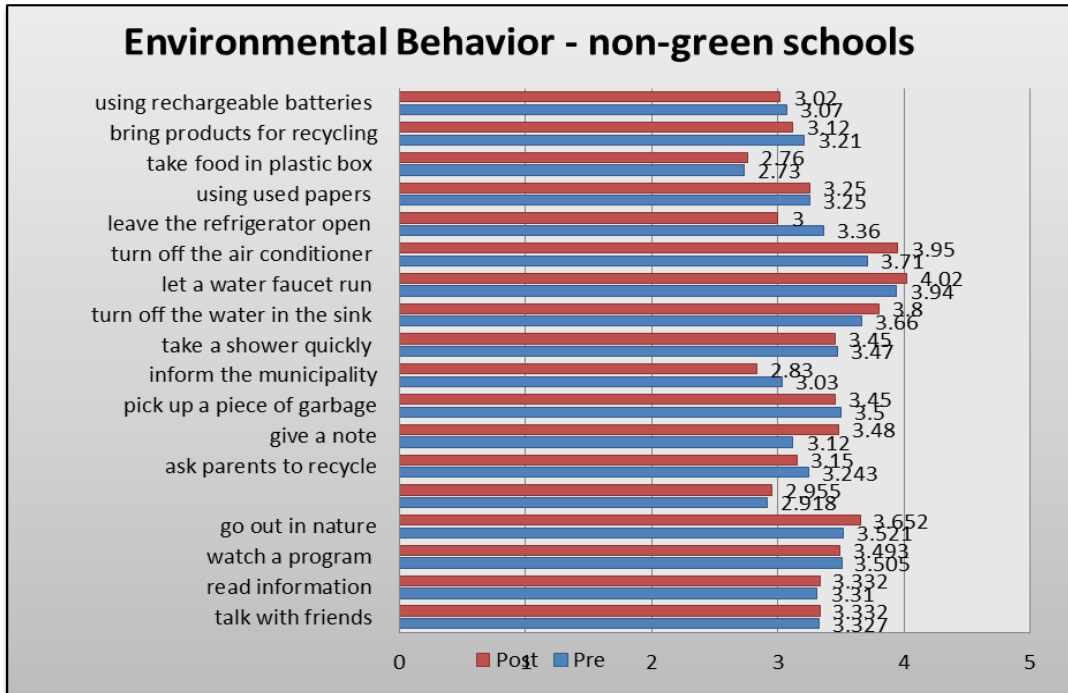
Fig. 3.14 - Environmental behavior of non-green schools at the beginning and at the end of the school year.
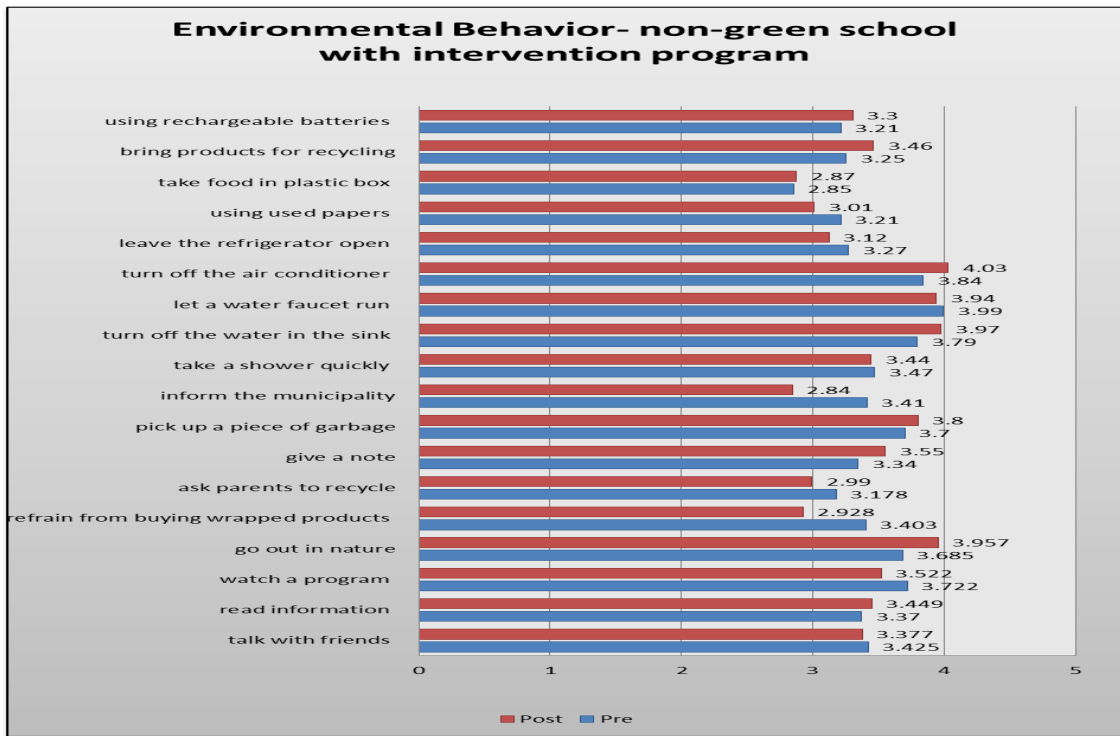
Fig. 3.15 - Environmental behavior of non-green school with intervention program at the beginning and at the end of the school year.

Table 3.12 - Scores in knowledge, attitudes, affect and behavior at the beginning of the school year

	All schools		Green schools		Non-green schools		Non-green school with intervention program	
	S	SD	S	SD	S	SD	S	SD
Knowledge	56.08	14.24	62.38	13.52	51.61	15.78	49.11	14.28
Attitudes	73.82	6.57	74.81	6.89	72.44	6.43	72.45	8.69
Affect	77.91	6.3	79.30	6.66	76.99	6.35	77.36	6.20
Behavior	66.65	7.79	66.84	10.55	66.52	5.94	69.01	5.73

(S: Score, SD: Standard Deviation)

Table 3.13 - Scores in knowledge, attitudes, affect and behavior at the end of the school year

	All schools		Green schools		Non-green schools		Non-green school with intervention program	
	S	SD	S	SD	S	SD	S	SD
Knowledge	57.36	13.9	62.76	11.77	53.60	16.45	63.85	14.91
Attitudes	73.52	6.92	74.46	7.00	73.38	6.74	73.36	8.45
Affect	80.42	6.8	80.91	7.92	80.12	6.14	81.06	7.96
Behavior	67.87	7.16	69.61	7.32	66.71	7.30	69.01	8.04

(S: Score, SD: Standard Deviation)

Environmental skills - This part examines the students' environmental skills. It includes an information text and two open questions related to the information text, which aim to identify understanding and high-order cognitive knowledge. The teacher who was present in the class during transferring the questionnaire was asked to read the information text in front of the students. In the first question, students were asked to identify the environmental problem from the information text and in the second question they were asked to suggest a solution to the problem and explain how this solution can reduce the problem. In the first question: the students who fully identified the problem from the information text received two points, the students who partially identified the problem received one point and those who were unable to identify the problem or their identification was incorrectly, received zero points. In the second question: students who suggested two correct solutions to the problem from the information text received two points and students who suggested one correct solution to the problem received one point and students who suggested incorrect and unacceptable solution received zero points. There has not been found any students from all schools participating who suggested three solutions.

When the questionnaire was transferred to the students at the beginning of the school year, 260 out of 361 students, that is 72.02% of the students, answered the first question that aimed to identify

the problem. 43 student, that is 16.53% of the students, identified the problem completely, 205 students, that is 78.84% of the students, partially identified the problem and 12 students, that is 4.61% of the students, did not succeed in identifying the problem. The total number of students who suggested solutions to the problem were 248 out of 361 students, that is 68.69% of the students. The number of students who suggested two correct solutions was 8, that is 3.22% of the students, the number of students who suggested one correct solution was 195, that is 78.62% of the students, and the number of students who suggested a wrong solution or unacceptable solution was 45, that is 18.36% of the students. According to the data that was collected from the questionnaires which were transferred at the end of the school year, 317 out of 351 students, that is 90.31% of the students, answered the first question about identifying the problem. Number of students who fully identified the problem was 50, that is 15.77% of the students, number of students who partially identified the problem was 255, that is 80.44% of the students, and number of students who wrongly identified the problem was 12, that is 3.78% of the students. The total number of students who answered the second question about suggesting solution to the problem were 310 out of 351 students, that is 88.31% of the students. Number of students who suggested two correct solutions was 15, that is 4.83% of the students, number of students who suggested one correct solution was 251, that is 80.96% of the students, and number of students who suggested incorrect or unacceptable solution was 44, that is 14.19% of the students (table 3.14).

Table 3.14 - Findings relating environmental skills of all students at the beginning and at the end of the school year.

	At the beginning of the school year		At the end of the school year	
Number of students participated	361		351	
	Number	Percentage	Number	Percentage
Students who answered the question about identifying the problem	260	%72.02	317	%90.31
Students who fully identified the problem	43	%16.53	50	%15.77
Students who partially identified the problem	205	%78.84	255	%80.44
Students who incorrectly identified the problem	12	%4.61	12	%3.78
Students who answered the question about suggesting a solution	248	%68.69	310	%88.31
Students who suggested two correct solutions	8	%3.22	15	%4.83
Students who suggested one correct solution	195	%78.62	251	%80.96
Students who suggested incorrect solution	45	%18.14	44	%14.19

Students who fully identified the problem knew that plastic products that are thrown in the garbage, at the end, reach the landfill, occupy a large area, distort the landscape, and accumulate because plastic does not decompose quickly.

Examples of answers: *After we use plastic products we throw them in the trash and in the end they reach the landfill and accumulate because they are made of plastic that does not decompose so they occupy a large area and distort the appearance of nature; Using plastic has advantages but also disadvantages.... plastic products that are thrown to trash do not decompose so they accumulate in large heaps, occupy a very large area and distort the natural landscape.*

Students, who partially answered the question, reported that the environmental problem mentioned in the text was the widespread use of plastic products; plastic usage is beneficial; the use of plastic causes damage; the plastic is not does not decompose quickly; plastic accumulate in nature; plastic distorts the view; and plastic pollutes the environment.

There was no convincing explanation, which means there was no full answer that indicates a complete identification and understanding of the problem.

Examples of answers: *The main problem mentioned is the text is that the use of plastic brings benefits, but also causes a lot of damages to the environment; Plastic does not decompose quickly therefore it is a big problem for the nature.*

There were answers of students that were unrelated to the question or have expressed a misunderstanding and failure in identifying the problem.

Examples of answers: *The environmental problem that was mentioned in the text is that plastic brings diseases to the environment; No for using plastic products; Yes for recycling plastic products; Deforestation causes environmental pollution; People throw plastic products along with the rest of the waste in the same tin; Wood and paper do not decompose quickly... plastic products always bring benefit; Distortion of landscape because rich people use nature; The use of metals and other products at home.*

Regarding the second question, in which students were asked to suggest a possible solution to the problem, there has been found few answers with two possible solutions and others but most answers with one possible solution to the problem.

Examples of correct solutions to the problem suggested by the students: *Recycling plastic products; Reusing plastic products; Reducing the use of plastic products; To Bury in designated locations away from residential areas; Not using plastic products at all; Amortization of creating plastic products; Using plastic boxes instead of plastic bags for taking food to school; Burning*

Plastic in designated areas away from residential areas; Placing a plastic recycling facility in each neighborhood; Using products made from other materials that decompose quickly; Sending letters to people and convincing them to recycle plastic products.

There were students who suggested wrong solutions to the problem or solutions that have no connection to the problem proposed. Examples of incorrect answers: *Preventing people from throwing plastic products on the floor; Not to throw plastic products in trash; Replacing plastic products with products that are made from materials that stay longer; Destruction of plastic products; Burning plastic products; Make another dump; No to accumulation of trash; Not to pollute the environment; Not to travel a lot by car or by bus; When we see garbage we must pick it up and put it in the trash; Plastic analysis; Not to use paper and wood; Not to throw trash in residential areas; Putting posters everywhere; Preventing rich people from using the environment; Reducing air and water pollution; Not to build a lot of houses; Planting trees.*

While comparing between green schools and non-green schools, it was found that the number of students that fully and partially identified the problem was bigger in non-green schools at the beginning and also at the end of the school year. It was found that the number of students who suggested correct solutions was bigger in non-green schools at the beginning and also at the end of the school year. Identifying the problem and suggesting correct solutions to the problem were better in non-green schools in which no environmental programs were activated. This difference between green (table 3.15) and non-green (table 3.16) schools can attest that the school curriculum or the teaching program has a positive effect on the students' environmental skills and this might be more effective than the impact of the environmental programs running today in primary schools.

Table 3.15 - Findings relating environmental skills of students in green schools at the beginning and a the end of the school year

	At the beginning of the school year		At the end of the school year	
Number of students participated	361		351	
	Number	Percentage	Number	Percentage
Students who answered the question about identifying the problem	119	%79.33	136	%94.44
Students who fully identified the problem	19	%15.96	17	%12.5
Students who partially identified the problem	93	%78.15	11	%81.61
Students who incorrectly identified the problem	7	%5.88	8	%5.88

Students who answered the question about suggesting a solution	117	%78	130	%90.27
Students who suggested two correct solutions	5	%4.27	5	%3.84
Students who suggested one correct solution	88	%75.2	101	%77.69
Students who suggested incorrect solution	24	%20.51	24	%18.46

Table 3.16 - Findings relating environmental skills of students in non-green schools at the beginning and at the end of the school year

	At the beginning of the school year		At the end of the school year	
Number of students participated	361		351	
	Number	Percentage	Number	Percentage
Students who answered the question about identifying the problem	141	%66.82	181	%87.44
Students who fully identified the problem	24	%17.02	33	%18.23
Students who partially identified the problem	112	%79.43	144	%79.55
Students who incorrectly identified the problem	5	%3.54	4	%2.20
Students who answered the question about suggesting a solution	131	%62.08	180	%86.95
Students who suggested two correct solutions	3	%2.29	10	%5.55
Students who suggested one correct solution	107	%81.67	150	%83.33
Students who suggested incorrect solution	21	%16.03	20	%11.11

Regarding the non-green school with the intervention program, the findings indicate that there was no significant change in the number of students who fully or partially identified the problem or those who were unable to identify the problem, between the beginning and the end of the school year.

Regarding the second part of the question, in which students were asked to suggest a solution to the problem, the situation was different because on the one hand the number of students who suggested two correct solutions and also who suggested one correct solution was increased, and on the other hand the number of students who suggested wrong solutions was decreased.

The number of students who suggested two correct solutions increased almost in 2.5%, the number of students who suggested one correct solution increased in 13% and the number of students who suggested incorrect or not related solutions to the problem has been reduced in 15.5%.

Before transferring the intervention program, the number of students who answered the question about identifying the problem was 65 out of 73, that is 89% of the students. At the end of the

school year the number of students who answered the question about identifying the problem was the same 65 students out of 71, that is 91.5% of the students. The number of students who fully identified the problem at the beginning of the school year was 10, that is 15.3% of the students, compared to 11 students, that is 16.9% of the students, at the end of the school year. The number of students who partially identified the problem at the beginning of the school year is 52, that is 80% of the students, compared to 53 students, that is 81.5% of the students at the end of the school year. The number of students who incorrectly identified the problem at the beginning of the school year was 3, that is 4.6% of the students, compared to one student, that is 1.5% of students, at the end of the school year. The number of students who answered the question about suggesting a solution to the problem at the beginning of the school year is 57 out of 73, that is 78% of the students, compared to 65 students out of 71 students, that is 91.5% of the students, at the end of the school year. The number of students who answered the question about suggesting a solution to the problem at the beginning of the school year was 57 out of 73, that is 78% of students, compared to 65 out of 71 students, that is 91.5% of the students, at the end of the school year. The number of students who suggested two correct solutions at the beginning of the school year was 3, that is 5.26%, of students compared to 5 students, that is 7.69%, at the end of the school year. The number of students who suggested one correct solution at the beginning of the school year was 40 students, that is 70% of students, compared to 54 students, that is 83% of the students, at the end of the school year. The number of students who suggested incorrect solutions at the beginning of the school year was 14, that is 24.5% of the students, compared to 6 students, that is 9.2% of the students, at the end of the school year (table 3.17).

Table 3.17 - Findings relating environmental skills of students in the non-green school with the intervention program at the beginning and a the end of the school year

	At the beginning of the school year before transferring the intervention program		At the end of the school year after transferring the intervention program	
Number of students participated	361		351	
	Number	Percentage	Number	Percentage
Students who answered the question about identifying the problem	65	%89.04	65	%91.54
Students who fully identified the problem	10	%15.38	11	%16.92
Students who partially identified the problem	52	%80	53	%81.53

Students who incorrectly identified the problem	3	%4.6	1	%1.53
Students who answered the question about suggesting a solution	57	%78.08	65	%91.54
Students who suggested two correct solutions	3	%5.26	5	%7.69
Students who suggested one correct solution	40	%70.17	54	%83.07
Students who suggested incorrect solution	14	%24.56	6	%9.23

According to the standard deviations, obtained at the beginning and at the end of the school year, it could be said that skills regarding environmental issues, of all students from all types of schools, are insufficient and are at the same level. Which means that there was not any students with much higher level or much lower level than the average.

It should be noted that the deviation from the average in the school in which the intervention program was transferred, has decreased from 10.63 to 5.89 and the score of skills has increased. Below, table 3.18 and 3.19 below presents the scores in skills at the beginning and the end of the school year.

The findings indicate that the students' skills, regarding identifying environmental problems and suggesting appropriate solutions, increased in all types of schools but in very small increments, which indicates that the skills of the students were not strongly affected by the environmental programs existing at the school and by the intervention program. It was also found that the impact, on the environmental skills, of the green school program was almost equal to the impact of the proposed environmental program.

This may be because the process of developing environmental skills of students takes time and it is not a matter of one environmental program or one school year. Therefore, in order to distinguish better results more time is needed.

Table 3.18 - Scores of skills at the beginning of the school year

	All schools		Green schools		Non-green schools		Non green school with intervention program	
	S	SD	S	SD	S	SD	S	SD
Skills	49.25	9.49	48.46	9.30	49.93	9.62	47.86	10.63

(S: Score, SD: Standard Deviation)

Table 3.19 - Scores of skills at the end of the school year

	All schools		Green schools		Non-green schools		Non green school with intervention program	
	S	SD	S	SD	S	SD	S	SD
Skills	50.65	7.54	48.00	7.50	52.61	7.62	53.46	5.89

(S: Score, SD: Standard Deviation)

Summary of Findings: general environmental knowledge of sixth grade students in the Arab sector is inadequate. This matches the results of a study in which a comparison was made between the government and the religious government sector and between the Arab sector and the Jewish sector. According to the research the EL level of in the Arab sector is the lowest. There was no difference in the level of environmental knowledge between the beginning and the end of the school year in schools and non-green green. The students' level of knowledge in green schools was slightly higher than the students' level of knowledge in non-green schools, at the beginning and at the end of the school year. The level of knowledge in the school in which the intervention program was transferred was the lowest among the five schools participated in the research at the beginning of the school year, but towards the end of the year and after transferring the intervention program, the knowledge level had significantly increased but in spite of this the final score of knowledge is still insufficient. At the beginning of the school year, the difference in the level of knowledge between the school with the intervention program and the green schools was significant in favor of the green schools, however, at the end of the year there was almost no difference between them and maybe a little in favor of the school with the intervention program. The difference in the level of knowledge between the school with the intervention program and the non-green schools was not significant at the beginning of the school year, however at the end of the school year the difference was significant in favor of the school with the intervention program and that proves that the intervention program had a positive impact on students' environmental knowledge.

In general, attitudes and willingness to act for the environment of all students participating were positive. Students' attitudes in "Green schools" were slightly more positive than the students' attitudes in non-green schools, at the beginning and at the end of the school year. This was expected because one of the goals of the environmental program "Green school" is to develop and strengthen positive attitudes towards the environment. In the school in which the intervention program was transferred, the students' environmental attitudes were similar to the students' attitudes in non-green schools and a little less positive than the green schools at the beginning and at the end of the school year. This

proves that the "Green school" program succeeded to influence the students' attitudes to be more positive better than the intervention program despite the fact that the impact of the two programs has been positive.

In general, the students' affect towards the environment was positive. The affect had improved during the school year (regardless of with or without green school program) in all types of schools. Students in green schools expressed love for animals, plants and nature a little more than other schools, but without a significant difference. In non-green schools the increase in affect was greater than in green schools. In the school in which the intervention program was transferred, the increase in affect was significantly larger and this indicates that there was an emotional involvement following the program. The emotional engagement can change attitudes, strengthen the willingness to act for the environment and to make decisions regarding ethical issues and environmental [113; 3; 4].

In general, the behavior level of the students was minimal to moderate. There was no difference in behavior in all types of schools at the beginning and at the end of the school year as well as in school in which the intervention program was transferred. This could be due to previous behavioral habits. According to Kollmus & Agyeman [68], previous behavioral habits of people constitute a significant barrier in shaping behavior. Therefore there is not a big impact of environmental programs. Behavior in green included more fields and a somewhat higher level than in non-green schools but the differences were not significant. The differences between the green schools and the school with the intervention program, in which students are more involved in the natural environment, and the rest of the schools, match the findings of the research that was conducted by Negev and her colleagues [102] on sixth and twelfth grade students from 182 schools, in which was found that students who were more involved in nature scored higher in knowledge, attitudes and behavior dimensions and students who were more exposed to natural experiences scored higher in all dimensions.

Regarding skills, in all types of schools, the number of students who answered the questions was small and the number of students from those who answered and were able to fully identify the problem was also small but most of them succeeded to partially identifying the problem. Regarding suggesting solutions to the problem, a small number of the students who answered the question was able to suggest two solutions to the problem but most of them succeeded to offer only one solution. The overall score of skills was relatively low in all types of schools. This matches the findings of the research that was conducted by MacBeth [82] and the research that was conducted by Marcinkowski

and colleagues [77], in which it was found that the skills level is the lowest among all the dimensions of the EL. The intervention program has positively impacted the students' skills and helped them to think more deeply and to suggest correct solutions to the proposed problem but there was no significant difference in the final score of skills between the school with the intervention program and the rest of the schools. In general, the majority of students have a moderate level of EL and a small portion of the students have a high or low level of EL and this is compatible with the research of Erdogan & Ok [37]. According to the findings of this current research, students who were exposed to EE received higher scores of EL and this validates the definition of Hsu that EE helps the individuals develop awareness of, knowledge and attitudes toward the natural environment, acquire skills and motivation to act actively and resolve environmental problems and issues, and develop active involvement in preventing environmental problems and protecting and improving environment [53]. And the setting of The fundamental aim of EE is to develop environmentally literate people who have responsible environmental behaviors [57; 58].

Correlations between the EL components - According to the correlations between the EL components that were done at the beginning of the school year, it was found that the correlation between knowledge and attitudes is medium which means that students who have more environmental knowledge have also positive attitudes towards the environment.

Regarding affect and behavior the correlation is weak, which means that students who have more environmental knowledge do not necessarily have positive affect towards the environment and do not necessarily behave positively for the environment and vice versa.

Regarding the other components, the correlation between attitudes and affect are almost strong, which means that students who have positive attitudes have also positive affect towards the environment. The same correlation was found between attitudes and behavior but in a lower extent and this means that students who have positive attitudes behave in a positive way for the environment.

Regarding behavior, the correlation with attitudes and affect are medium which means that the correlation is not strong but it exists. Students who have positive attitudes and affect towards the environment behave in a positive way for the environment unlike the correlation between the behavior and the knowledge.

At the end of the school year the situation was similar except that the correlation between the knowledge and attitudes was weaker but in a significant degree.

In general, high environmental knowledge does not necessarily bring positive attitudes, affect and responsible behavior for the environment and vice versa regarding low environmental knowledge, but positive attitudes and affect may bring positive behavior. Positive attitudes go with strong affect and sensibility, which means positive attitudes bring positive affect and vice versa. Correlations between EL components at the beginning and at the end of the school year are presented in table 3.20 and table 3.21.

Table 3.20 - Correlation between EL components at the beginning of the school year school

Variable	In correlation with variable	*Extent of correlation (r)	Correlation
Knowledge	Attitudes	0.3551	Medium
Knowledge	Affect	0.1653	Weak
Knowledge	Behavior	-0.0063	Week
Attitudes	Affect	0.5680	Medium
Attitudes	Behavior	0.3109	Medium
Affect	Behavior	0.4100	Medium

*(r<0.03: weak correlation, 0.03<r<0.07: medium correlation, 1>r>0.07: strong correlation)

Table 3.21 - Correlation between EL components at the end of the school year school

Variable	In correlation with variable	*Extent of correlation (r)	Correlation
Knowledge	Attitudes	0.2567	Weak
Knowledge	Affect	0.1195	Weak
Knowledge	Behavior	-0.0013	Week
Attitudes	Affect	0.6317	Medium
Attitudes	Behavior	0.3816	Medium
Affect	Behavior	0.5299	Medium

(r<0.03: weak correlation, 0.03<r<0.07: medium correlation, 1>r>0.07: strong correlation)

Summary of the findings - Regarding correlation between the components of EL, it was found that a high level of knowledge does not necessarily bring more positive affect and behavior. More positive

attitudes bring more positive affect and behavior and vice-versa. More positive environmental affect brings more positive behavior and vice versa.

Connection between Environmental Literacy and independent variables – Connection between EL and source of knowledge - Another issue that was examined in this research was the students' sources of knowledge regarding environmental issues. Students were asked to indicate, from a list, the source of their environmental knowledge according to their opinion. At the beginning of the school year 360 students answered the question about the source of knowledge. Number of students who chose only one source of knowledge was 155: 39 students chose school, 15 students chose family members, 22 students chose TV, 19 students chose books, 60 students chose computer / internet. The rest of the students (205) chose more than one source of knowledge. At the end of the school year 351 students answered the question about the source of knowledge. The number of students who chose only one source of knowledge was 124: 41 students chose school, 17 students chose family members, 10 students chose TV, 13 students chose books, 43 students chose computer / internet. The rest of the students (227) chose more than one source of knowledge. In general, most students chose more than one source of knowledge and more than third of the students who chose one source of knowledge chose the computer / internet. Table 3.22 presents the scores of EL components according to students' source of knowledge at the beginning and at the end of the school year.

Table 3.22 - Scores of EL components according to students' source of knowledge at the beginning (pre) and at the end (post) of the school year

	Knowledge score		Attitudes score		Affect score		Behavior score		Skills score	
Students' source of knowledge	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
School	53.23	61.11	75.15	73.20	80.35	80.33	67.30	66.41	49.84	49.84
Family members	35.60	44.15	66.72	69.10	76.38	80.41	64.60	60.19	47.04	47.04
TV	51.60	49.25	72.16	64.18	93.63	72.43	73.20	68.53	41.33	41.33
Books	17.93	46.43	70.10	70.43	86.31	80.88	71.70	67.04	52.40	52.40
Internet	55.02	49.08	70.01	69.15	90.33	76.65	65.10	67.91	45.62	45.62
Mixed*	60.15	60.23	75.04	75.50	85.85	82.78	65.90	68.95	50.99	50.99

(* Mixed: a mixture of two sources of knowledge or more).

It was found that students who chose mixed sources of knowledge, that is two or more sources out of five sources of the list (school, family members, TV, books, internet), received the highest score in knowledge, attitudes and affect. Students whose source of knowledge was TV, received the highest score in behavior but with a very little difference from the other scores. Students, whose source of knowledge was only books, received the highest score in skills but with a small difference.

Students who chose the school as the only source of knowledge received the highest overall score among students who chose a single source of knowledge, which means that the school is very important and affects the students' EL. After school come the students whose source of knowledge was only TV, after that the internet and at the end the family but with small differences. There is no big difference in the overall score of the students in relation to the source of knowledge but when the source of knowledge is mixed different sources it enhances the EL.

Connection between EL and gender - From the analysis it was found that the level of knowledge, attitudes, affect, behavior and skills of girls is a little bit higher than the boys but without a significant change. From the comparison of the EL components between boys and girls, it was found that the significance level of the knowledge component is $p=0.19$ which means that $p>0.05$, the significance level of the attitudes component is $p=0.07$ which means that $p>0.05$, the significance level of the affect component is $p=0.18$ which means that $p>0.05$, the significance level of the behavioral component is $p=0.33$ which means that $p>0.05$, and the significance level of the skills component is $p=0.29$ which means that $p>0.05$. That means that the difference in all the components of the EL between boys and girls is not significant. Regarding the knowledge, girls knew better than boys that disposable diapers cannot be recycled, the ozone hole is a major environmental problem that is caused because of the increasing penetration of the harmful solar radiation to Earth, the main problem in landfills is that they occupy a large area, the amount of open spaces in the country today is going down because of the increase in the population, the advantage of using solar water heater is power saving, the most eco-friendly method to take home shopping is through using a paper bag, the symbol of recycling and that the Ministry of the Environment is an organization that works for the development of preserving the environment and for education for quality. In the other issues of knowledge, in which students were examined, the differences between boys and girls was small and sometimes in favor of boys. Regarding attitudes, the girls expressed a greater consent with the statements about imposing fines on factories that cause damage to the environment, the need to reduce the use of petroleum because it pollutes the environment and the willingness to walk instead of travelling by car in order to reduce air pollution. In other statements, that express attitudes, there was no significant difference between boys and girls, sometimes there was a

difference in favor of boys. Regarding affect, girls expressed greater love for plants and nature and greater anger when thinking about the damage that the pollution causes to the environment. In the other statements was not significant difference between boys and girls. Regarding behavior, girls noted, more than boys, that they take a shower quickly, close the tap when brushing their teeth, open the tap only when needed and turn off the air conditioner and the lights before leaving the house. That means, they noted that they save water and electricity more than boys. In other statements there was no significant difference between boys and girls. Regarding skills, girls knew better than boys to identify the problem from the information text and knew much better than boys to suggest solutions to the problem mentioned (table 3.23).

Table 3.23 - Differences in scores of the EL components according to gender

Environmental Literacy Components	Girls Scores	Boys Scores	Significance Level *(p)
Knowledge	57.82	54.29	0.19
Attitudes	75	72	0.07
Affect	79.9	77.4	0.18
Behavior	67.1	66	0.33
Skills	52	46	0.29

*(P<0.05 significant difference, P>0.05 not significant difference)

Connection between EL and father's educational level - The scores in EL components of students whose fathers received higher education, or received diplomas from universities or colleges, were equal or less than the scores of students whose fathers have completed elementary, middle and high schools, but with no significant difference. From the comparison, it was found that the significance level of the knowledge component, among the four groups of students, was p=0.35 which means that p>0.05, $F_{df=3}=1.09$, the significance level of the attitudes component was p=0.69 which means that p>0.05, $F_{df=3}=0.68$, the significance level of the affect component was p=0.71 which means p>0.05, $F_{df=3}=0.45$, the significance level of the behavioral component was p=0.65 which means that p>0.05, $F_{df=3}=0.54$, and the significance level of skills component is p=0.96 which means that p>0.05, $F_{df=3}=0.07$. The difference in all the components of the EL was not significant.

Regarding the knowledge component, students whose fathers received a university education gained lower scores compared to the scores that the rest of the students gained, almost in half of the questions. The scores of the rest of the knowledge questions were equal or slightly higher than the scores of the rest of the students. Students whose fathers had received higher education knew better than students whose fathers had completed primary, middle and high schools, that today most of the gardens garbage and the food waste are recycled into compost (organic fertilizer), the plastic bottles

after they are put in the recycling facility they are cut into small pieces in order to make of them different products and the benefit of using the sun boiler is power saving. In the rest of the knowledge questions the difference was not high and sometimes it was in favor of the students whose fathers have completed only primary schools. In general, the differences in knowledge between the four groups were not significant. Regarding attitudes, students whose fathers received higher education expressed greater agreement compared to the rest of the students, with the statements about the need of doing something about the dirt in the streets and the willingness to write letters and ask people to help reduce pollution. In the rest of the statements there was not a big difference between students and several statements were in favor of the students whose fathers had completed only primary schools or middle schools, this means that the scores of the students whose fathers had received higher education was the lowest. In general, the differences in attitudes between the four groups were not significant. Regarding the affect, students whose fathers had received higher education, expressed a greater agreement, compared to the rest of the students, with the statements about the love of nature, the anger when thinking about the damage that the pollution causes to the environment, the anger when thinking about the companies that make experiments on animals to test some products, the joy when seeing people trying to save energy, the fear from the effect of pollution on family and the anger when thinking about the things that people throw away instead of recycling. In the other statements, there were not large differences between students and sometimes they were in favor of the students whose fathers had completed primary, middle and high schools. This means that the difference in affect, in general, was not significant. Regarding behavior, students whose fathers had received higher education have stated, in a greater level compared to the rest of the students, that they suggest to their parents to stop or reduce purchasing packaged products that are not needed in order to reduce the amount of waste. In several statements, students whose fathers received a university education received the lowest scores, such as in the statements about taking a quick shower in order to save water, turning off the air conditioner and the lights before leaving home and using used paper for a draft writings. In the other statements, there were no differences in scores between the four groups. The differences in the behavior component, in general, were not significant. Regarding skills, there was no difference in scores between students whose fathers receive higher education and the rest of the students and in most cases the scores were in favor of the students whose fathers did not receive higher education, namely students whose fathers have completed middle schools. Table 3.24 presents the difference in scores of EL components according to father's education.

Table 3.24 - Difference in scores of EL components according to father's education level

Environmental Literacy Components	Scores of students whose fathers received higher education	Scores of students whose fathers completed high school	Scores of students whose fathers completed middle school	Scores of students whose fathers completed primary school	Significance Level *(p)
Knowledge	53.19	56.09	58.59	59.86	0.35
Attitudes	73.00	73.91	72.72	75.20	0.56
Affect	79.73	78.47	77.32	80.12	0.71
Behavior	65.80	67.28	64.66	67.84	0.65
Skills	48.32	48.83	52.70	50.00	0.96

*(P<0.05 significant difference, P>0.05 not significant difference)

Connection between EL and mother's education level- There were no differences in the scores of the four groups of students (students whose mothers received a university education, students whose mothers completed secondary school, students whose mothers completed middle school and students whose mothers completed primary school) in all elements of the EL. As a result of the comparison it was found that the significance level of the knowledge component is p=0.42 which means that p>0.05, $F_{df=3}$=0.94, the significance level of the attitudes component is p=0.71 which means that p>0.05, $F_{df=3}$=0.45, the significance level of the affect component is p=0.84 which means that p>0.05, $F_{df=3}$=0.27, the significance level of the behavior component is p=0.91 which means that p>0.05, $F_{df=3}$=0.16, and the significance level of the skills component is p=0.79 which means that p>0.05, $F_{df=3}$=0.34. The difference in all the components of the EL was not significant. The number of students in the fourth group (whose mothers have completed primary school) was very low therefore while analyzing the results the reference is only for the first three groups. Regarding the knowledge component, students whose mothers received a university education, knew better than students whose mothers completed middle and high school, that the main source of energy on the planet is the sun, the environmental science is a science that investigates the relationship between all living creatures and their environment, the petroleum is a limited source of energy that might end, most of the water in nature are salted, most garden garbage and food waste are recycled today into compost (organic fertilizer) and deforestation is causes global warming. In the rest of the knowledge questions the difference there was not big and sometimes it was in favor of the students whose fathers had completed middle and high school. In some questions, students whose mothers received higher education received the lowest scores, such as the questions about the product that decompose in the lowest rate, coal burning in power stations causes an environmental problem because toxic gases are emitted into the air, the largest field that uses water today is in the field of houses and cities, the largest polluters in the country today are the gases that are emitted from transportation, after putting

the plastic bottles in the recycling facility they are cut into small pieces in order to produce different products, the most friendly way to take shopping home is by a paper bag, the car is the most harmful mean of transport and the species that no longer exists are extinct species. In some questions, the students whose mothers received higher education gained the lowest scores, such as the questions about the product that decomposes in the lowest rate, the coal burning in power stations that causes an environmental problem because of the toxic gases emitted into the air, the largest field that in which we use water today is the houses and cities, the largest polluters in the country today are the gases that are emitted from transportation, after putting the plastic bottles in the recycling facility they are cut into small pieces in order to produce different products, the most friendly way to take shopping home is by a paper bag, the car is the most harmful mean of transport and the species that no longer exists are extinct species. In general, the difference in knowledge between the three groups was not significant. Regarding attitudes, students whose mothers received higher education expressed greater agreement, comparing to the other students, with the statements about the ability to help in improving the environment by personal behavior, the need to impose a fine on the factories that cause damage to the environment, the need to create power in less polluting ways, the water pollution is considered to be bad even if it is not harmful to man because it is harmful for animals and plants and the need to do something about the dirt in the streets. In the other statements there was not a big difference between students and several statements were in favor of the students whose mothers finished only middle or high school. In general, the difference in attitudes between the three groups was not significant. Regarding affect, students whose mothers received higher education expressed a greater agreement to the statements about the love of nature, the joy when you see people recycle bottles, cans and batteries, the anger when thinking about the companies that make experiments on animals to test some products, the joy when seeing that some people are trying to save energy, the fear from the effect of pollution on family, the anger when thinking about people who throw things that could have been recycled and the anger when seeing people using water more than necessary. In the other statements, there was not a significant difference in the scores, that is, in general, the difference in affect and sensitivity between the three groups of students, was not significant. Regarding behavior, students whose mothers received higher education have stated, in a greater level than the rest of the students, that they travel a lot with their families in nature and that they suggest to their parents to stop or reduce buying unnecessary packaged products. In the other statements, there was not a significant difference among the three groups. In general, the difference in the behavior component in the three groups was not significant. Regarding skills, the students whose mothers received higher

education, comparing to the other students, got the lowest scores in the questions about identifying problems and suggesting solutions to the problems but the difference was not significant. That is, in general, the difference in the skills component among the three groups was not significant. Below, table 3.25 presents the difference in scores of EL components according to mother's education.

Table 3.25 Difference in scores of EL components according to mother's education level

Environmental Literacy Components	Scores of students whose mothers received higher education	Scores of students whose mothers completed high school	Scores of students whose mothers completed middle school	Significance Level *(p)
Knowledge	54.71	56.83	57.74	0.42
Attitudes	73.30	73.49	74.73	0.71
Affect	79.78	78.06	77.93	0.84
Behavior	65.66	67.23	65.70	0.91
Skills	49.87	48.31	55.55	0.79

*(P<0.05 significant difference, P>0.05 not significant difference)

Connection between EL and parental profession - Regarding parental profession, the students were divided into two groups only because most of their mothers are housekeepers and do not work outside the house. The first group is the group of students whose parents (especially their fathers) work in a profession that requires higher university education (such as a lawyer, teacher, dentist, engineer, electrician ...) and the second group is the group of students whose parents (especially their fathers) work in a profession that does not require higher university education (such as a construction worker, a simple factory worker, a gypsum worker, a guard, a mechanician ...). No significant difference was found between the students whose parents work in professions that require higher education and the students whose parents work in professions that do not require higher education in all the components of the EL. The level of significance of the knowledge component is p=0.49 which means p>0.05, the significance level of the attitudes component is p=0.19 which means p>0.05, the significance level of the affect component is p=0.14 which means p>0.05, the significance level of the behavior component is p=0.48 which means p>0.05 and the significance level of the skills component is p=0.46 which means p>0.05. Regarding the knowledge component, almost in half of the questions, the scores of the students' whose parents work in professions that require higher education were greater than the scores of the students' in the second group. In the rest of the questions the scores were equal or in favor of the students whose parents work in professions that do not require higher education but in small differences. In general, both groups received the same average score of

the knowledge questions which means that there is no difference at all. Regarding the attitudes component, the students whose parents work in professions that require higher education expressed greater consent than the students in the second group with more than half the statements and in the other statements the scores were equal or in favor of the students whose parents work in professions that do not require higher education but in very small differences. In general, the attitudes of students whose parents work in professions that require higher education were more positive but in a difference that is not significant. Regarding the affect, the students whose parents work in professions that require higher education expressed greater agreement than the students in the second group in almost all the statements of affect. This indicates, that their affect was more positive, but in a difference that is not significant. Regarding the behavior component, the results were the same. Half of the statements were in favor of the students whose parents work in a profession that require higher education and the other statements were in favor of the students in the second group, but in very small differences. This means, in general, the average scores in behavior was equal in both groups. Regarding the skills component, the scores on identifying problems and suggesting solutions to the problems, were slightly higher among the students whose parents work in professions that require higher education but without a significant difference. Below, table 3.26 presents the differences in scores of EL components according to parents' profession.

Table 3.26 - Differences in scores of EL components according to parents' profession

Environmental Literacy Components	Scores of students whose parents work in professions that require higher education	Scores of students whose parents work in professions that do not require higher education	Significance Level *(p)
Knowledge	56.09	55.99	0.49
Attitudes	74.81	73.27	0.19
Affect	81.19	78.17	0.14
Behavior	66.48	66.64	0.48
Skills	49.88	48.87	0.46

*($P < 0.05$ significant difference, $P > 0.05$ not significant difference)

Connection between EL and time spent outdoors - From the comparison between the four groups of students that present different periods of spending times outdoors during the day (students who spend five hours or more, students who spend three to four hours, students who spend one to two hours, students who do not spend time outdoors), it was found that there were no significant differences in scores of EL

components. From the comparison it was found that the level of significance between the four groups of students of the knowledge component is p=0.21 which means p>0.05, $F_{df=3}=1.51$, the level of significance of the attitudes component positions is p=0.28 which means p>0.05, $F_{df=3}=1.28$, the significance level of the affect component is p=0.79 which means p>0.05, $F_{df=3}=0.33$, the significance level of the behavioral component is p=0.82 which means p>0.05, $F_{df=3}=0.30$, and the level of significance of the knowledge component is p=0.85 which means p>0.05, $F_{df=3}=0.25$. The difference in all components of the EL among all groups was not significant.

Regarding the knowledge component, students who spent five hours or more outdoors during the day received lower scores than the scores that the rest of the students received almost in most of the knowledge questions. In the rest of the knowledge questions the scores were equal to the scores of the other students. Students, who spent five hours or more outdoors did not have advantage to any knowledge question except the question about the disposable diapers that cannot be recycled or used again, but in general, the difference in knowledge scores among the four groups was not significant. Regarding the scores of attitudes, the students who spend five hours or more outdoors during the day received scores almost identical to the scores of the students in the other groups, that means, with no significant difference but in some statements their consent was less positive than the students in the other groups, such as the statements about the importance of protecting the animals and plants not only because they are effective to humans, the ability of each person to affect the environment, the willingness to walk instead of riding a car in order to reduce air pollution, the willingness to sort the home waste for recycling and the willingness to go from house to house and try to convince people to recycle waste. In general, the differences in attitudes between the four groups were not significant. Regarding affect, the students who spend five hours or more outdoors expressed a greater consent than the students in the other groups with the statement about the fear when thinking about the impact of pollution on the family, but with some statements their consent was less positive particularly with the statements about the anger when considering the damage that the pollution causes to the environment, the joy when people recycle bottles, cans and paper and the anger when seeing people use water more than they should. In general, the differences in scores of affect between the four groups were not significant. Regarding the behavior component, the students who spend five hours or more outdoors received lower grades than the scores of the students in the other groups, almost in half of the statements and in the second half the scores were nearly identical between the four groups without a significant change. There was no advantage in any statement in favor of the students who spend five hours or more outdoors during the day. In general, there was no significant difference in the average scores of behavior between the four groups. Regarding the skills, there was no difference in the scores between students who spend time outdoors but it

is worth noting that the students in the fourth group, who usually do not hang out at all, received the lowest average scores without a significant difference. Below, table 3.27 presents the differences in scores of EL components according to the time spent outdoors.

Table 3.27 - Differences in scores of EL components according to the time spent outdoors during the day

Environmental Literacy Component	Scores of students who spend five hours or more outdoors	Scores of students who spend three to four hours outdoors	Scores of students who spend one to two hours outdoors	Scores of students who do not spend time outdoors	Level of Significance *(p)
Knowledge	50.38	57.66	58.17	58.02	0.21
Attitudes	72.16	74.29	74.14	71.42	0.28
Affect	77.66	79.86	78.86	77.55	0.33
Behavior	65.16	67.23	66.99	67.34	0.82
Skills	50.14	50.43	49.13	44.19	0.85

*($P<0.05$ significant difference, $P>0.05$ not significant difference)

Summary of the findings - Regarding the source of knowledge it was found that students whose source of knowledge was varied gained the highest total score in EL. Students whose source of knowledge was only the school gained the highest score out of the students who chose a single knowledge source, followed the students whose source of knowledge was the television, followed by the computer and at the end members of the family. No significant difference in EL was found between boys and girls. This contradicts the research that was conducted by Bloom [10] on ninth graders, from 24 different schools in order to test knowledge, attitudes, source of knowledge and connection to background variables, in which was found that boys got higher scores in all subjects. No significant difference was found in EL of students in relation to father's education level. No significant difference was found in EL of students in relation to mother's education level. This contradicts the research of Goldman et al. [44] in which was found that students whose mothers have higher education level showed a more responsible behavior for the environment, especially in matters of recycling. No significant difference was found in EL of students in relation to parents' profession and time spent outdoors.

In summary, this chapter dealt with the quantitative analysis of the questionnaire's findings concerning all components of the students' EL, connection between background variables and EL and correlation between EL components. Next part of this chapter focuses on the findings of the

environmental perceptions and perceptions concerning environmental programs (main goals, effectiveness and contribution) of teachers and students.

3.3. Environmental Perceptions of Students and Teachers

This chapter presents the inductive content analysis of the group interviews (focus groups) with students and the interviews with teachers about their general environmental perceptions and their perceptions regarding the environmental programs, their goals and their contribution.

Perceptions of Students - Students' environmental perceptions and perceptions regarding the goals and the effectiveness of the environmental programs, were examined by group interviews. Students' answers to the questions were analyzed through an inductive content analysis. It has been found, from the data analysis that students perceive concepts in various ways. From the analysis of the students' responses to the question: "What does the concept "environment" mean to you?, four categories were found: the environment as a physical place, as a living place for human beings; the environment as a complex of natural factors; the environment as a complex of natural and man-made factors; the environment as a source of pleasure and relaxation and peace. The second category relates to the environment from a biocentric perspective that places the nature in the center. The third category relates to the environment in which human, nature and society are incorporated, in accordance with the currently accepted scientific approach, of the concept "environment" [128; 182]. The fourth category refers to the concept of environment from an anthropocentric perspective, that focuses on human and his needs. A small portion of the students referred to the environment as a physical place or as a complex of natural and human-made factors and a greater proportion of students referred to the environment as a complex of natural factors or as a source of pleasure, serenity and peace. Students in the green school less referred to the environment as a source of pleasure, peace and tranquility compared to the non-green school. Students in the green school referred to the environment as a complex of natural and human-made factors more than the students from the non-green school.

Examples of students' answers from the green school: It has animals and plants and a beautiful view (biocentric approach); *The environment is everything in nature around us such as family... neighbors... school... animals and plants* (sustainability approach). Examples of students' answers from the non-green school: *The environment is the natural place that we live in* (physical space); *The environment is a place with beautiful scenery that is fun to hang out in it* (anthropocentric approach).

From the analysis of students' answers to the question: What does the concept "natural environment" means to you? two categories were found: a reference to the human act and a reference to the biotic factors in nature (an environment in which wild animals and plants live together and alone).

An example of a student's answer from the green school: *It is an environment that people did not touch or did not cause any damage* (sustainability). An example of a student's answer from the non-green school: *It is an environment in which everything is natural and full of animals such as birds… insects and plants* (Biocentric).

From the analysis of students' responses to the question: "What does the concept" artificial environment" means to you? two categories were found: a reference to human act (an environment that was handled by human, an environmental with damages such as construction), and a reference to biotic factors in nature (an environment in which people live with domesticated animals and cultivated plants). In the green school when students described the natural and the artificial environment they emphasized more the issue of the damages that people make to the environment, however, in the non-green school they emphasized the wild animals and plants in the natural environment versus the domesticated animals and the cultivated plants in the artificial environment and that they cannot live or grow without the help of human.

Examples of students' answers from the green school: *Artificial environment is an environment where everything in it is made of human activity such as in the park* (sustainability approach); *It is an environment in which people built houses and caused damages to nature* (sustainability approach). An example of a student's answer from the non-green school: *According to what we learned in the second grade it is an environment that has domesticated animals and cultivated plants* (biocentric approach).

From the analysis of students' responses to the question: "What does the concept "quality of environment" means to you? two categories were found: a descriptive answer in which students described the environment status and an answer that points to an active action for the environment (a specific environmental action such as cleaning the environment or a global environmental action such as saving and accountability for the environment). Students in the green school referred more to active actions and activism for the environment and less described the status of the environment on the contrary of the non-green school, but the two categories were found in both types of schools.

Examples of students' answers from the green school: *The environment is measured according to how good and pleasant is it to live in* (descriptive); *The environment is better as long as it has more*

natural things (descriptive). Examples of students' answers from the non-green school: *Quality of environment means to keep clean everywhere... at home... at school... and also at public places* (specific action); *To protect the environment... the nature... the animals and the plants* (global Action).

From the analysis of the questions about teachers' reference to the environment subject in the school, two categories were found: reference to the science teachers and reference to all the teachers in the school. Students in the non-green schools noted that only science and geography teachers refer to environmental issues and in all the other subjects there is almost no attention to environmental issues. Conversely, students from the green schools stated that apart from science and geography teachers, educators sometimes refer to environmental issues at education hours and also language teachers in some lessons they relate to environmental issues. This matter validates the principles of the green school program regarding the integration of environmental issues in all subjects of teaching.

Examples of students' answers from the green school: *Most teachers address the subject of environment... also the educators..... especially the social education coordinators and the science teacher; In the English lesson last week we learned about water pollution.* Examples of students' answers from the non-green school: *The science teacher and the geography teacher relate a lot to the subject of environment but not every day ...... it depends on the subject we learn; No.... we also learned about environment during the education lessons with the our educator teacher.*

Regarding students' perceptions about the goals of the environmental program, the students in the green school were asked about the goals of the green school program that exists in their school and the students from the non-green school were asked about the goals of the environmental programs in general, that they heard about or that exist in other schools.

From the analysis of the answers to the questions that examined students' perceptions regarding the goals of the environmental programs, six types of responses were found: to enrich the knowledge (cognitive); to act for the environment behavioral); to strengthen the relation with the environment (Affective); to learn how to use resources wisely / to maintain resources (behavioral); to foster the external appearance of the school (behavioral); and to perform researches on the environment (cognitive). Students from the green school succeeded better in identifying the program targets. They stated that the goals of the green school program, that exists in their schools, is to enrich the knowledge of the students, to link and involve the students in the environment, to make good contact with the environment, to act for the environment, to develop love and concern for the environment, to do something good for the society, to learn to use the resources in wise ways and not to cause

environmental damage. This testifies the sustainability approach that is implemented in the school. Conversely, students from the non-green school noted that the purpose of the environmental program in general is to learn more about the environment, to foster school appearance, to devote an area for animals, to plant trees and plants and to perform environmental studies such as studies on plants. It was clear that the emphasize in non-green schools was on the appearance and on the enrichment of knowledge. There was no mention to environmental involvement, environmental action, love and concern for the environment and responsible environmental behavior. These results were expected because students in non-green schools are not involved in environmental projects as the students in green schools, neither inside the school nor outside of it.

An example of a student's answer from the green school: *The goal of the green school program is to teach us how to maintain the environment.... to love the environment.... to do good things for the environment... just like we do in school .... we recycle paper and plastic bottles* (behavioral and affective). An example of a student's answer from the non-green school: *I think that any program about environment is good... because for sure through these programs we will learn about environmental issues which are very important... because we do not learn a lot about environment in our classes... in these program there are many trips in nature and this is very important in order to learn more about environment... and in order to love nature* (cognitive and affective).

Regarding the expectations from the environmental program, two categories were found in the analysis of students' answers: contribution to the appearance of the school and the neighborhood (behavioral); and contribution to students' awareness, affect, attitudes and behavior (cognitive, affective and behavioral). The students in the green school have stated that the program "green school" contributes a lot to the school and to the neighborhood because the students become more aware, more involved, more loving, caring and acting for the environment. Students in the non-green school believed that environmental programs in general will contribute a lot to the school and the neighborhood but they failed to explain exactly how. They referred more to the appearance of the school and the neighborhood, especially cleaning, and did not refer to students' knowledge, attitudes and behavior.

Examples of students' answers from the green school: *The program green school in our school contribute a lot to students... students today know more about the environment... appreciate and love the environment... do good things for the environment* (cognitive, affective and behavioral), *The program has changed the appearance of the school... it is now more beautiful... thanks for students and teachers* (behavioral). Examples of students' answers from the non-green school: *environmental*

programs help the school... and the neighborhood... to look more clean and more groomed (behavioral); *I expect that environmental programs will turn the school yards into a clean and pleasant place for students that they will want to spend all day in it... and I also believe that an environmental program will help decorate the classrooms in order to look more beautiful* (affective and behavioral).

From the analysis of the students' answers to the questions that aimed to examine their awareness about environmental problems, one category was found: a reference to specific problems and not to global problems such as the Earth's global warming. Students from the green and the non-green school were identically aware of the existing environmental problems in the school and in their living area. Students in both types of schools addressed, mostly, to these problems: the accumulation of garbage; garbage incineration in street's tankers; the gases emitted from means of transport and from factories; smoking; construction versus green areas. Students in the green school referred also to not maintaining cleanliness in public places. This indicates that students' awareness of environmental problems in both types of schools are in a small scale which consists mainly of the school and the neighborhood.

Examples of students' answers from the green school: *The most common environmental problems in our neighborhood are the accumulation of garbage in the streets that distort the view... some people burn piles of garbage into or near the garbage tanker and this causes a bad smell and we have to suffer; The problem in our sector is that we do not know how to maintain cleanliness in public places... look for example at the difference between us and the Jews... they know better how to keep clean that's why their cities are more beautiful ... it's really a serious problem*. An example of a student's answer from the non-green school: *We have a lot of problems in our neighborhood... there are factories in the neighborhood... and there are a lot of cars... the air is not so clean; Our neighborhood is very crowded... there are many cars that emit toxic gases... even at school we are surrounded by lots of shops and factories and a large shopping center... all this makes noise and air pollution.*

Regarding the responsibility for the environmental problems, two categories were found in the students' answers: the responsibility of the self, me or us; and the responsibility of others. All students in both types of schools, stated that humans are responsible for all the problems and the damages in the world. Students in both groups compared between Arabs and Jews in neighboring regions and said that the Arabs do not keep the streets and the neighborhoods clean like the Jews and the municipality does not worry enough, as in the nearby cities where Jews and Arabs live together or in Jewish

neighborhood. Students from the green school referred more to the personal responsibility of each individual and of all people and less accused others. They said the director, teachers and students are responsible for the problems. Students in the non-green school referred mainly to the authorities as the main cause and less accused themselves or the people in general. They noted that the municipality is responsible for the environmental problems in the neighborhood and the city in general and it is responsible for finding solutions. This testifies that the relation between the green school and the municipality is stronger and that they acknowledge the municipality, but in both types of schools, the two approaches were found.

Examples of students' answers from the green school: *We are responsible for the environmental problems at school and the neighborhood because we are the ones who live in them... we are taking advantage of the nice things that exist in them... and on the other hand... we throw things and pollutes... without any concern; Yes... the human is responsible for the environmental problems... If there were not people ... there were no damages in the nature.* Examples of students' answers from the non-green school: *All the people are responsible for the environmental problems in the world... but there are people who care about the environment and maintain it more than others; The municipality is responsible for the problems in the city... there are always piles of garbage in the streets and they do not care... they should put more garbage tankers in the streets and make sure to pick up garbage twice a day... once a week is not enough.*

From the analysis of the answers to the questions about the school activities, two categories were found: action in a broad sense; and action in a sense that is confined to the cleanliness subject. Students from the green school stated that in their school they learn about environment almost in all subjects of teaching, they recycle bottles, cans and paper, they care about fostering and cleaning the school and the neighborhood, students from last year adopted a site close to the school and cultivated it, they involve parents in activities about environment at school and they maintain green spaces. Students in the non-green school said that in their school they learn about environmental issues as part of the science and geography classes and that they care about fostering and cleaning classes and schoolyards. They referred to the cleanliness as the main environmental action and they think that learning how to protect the environment is an action for the environment. This indicates that the extent of environmental action in green schools is larger than in non-green.

Examples of students' answers from the green school: *In our school we recycle bottles and cans and paper... and batteries... we also help in fostering public places in the city like last year we helped in cultivating a public garden; We also do a lot of cleaning in the school.* Examples of students'

answers from the non-green school: *teachers in our schools teach us a lot about environment especially during science classes... we learn how to protect the environment... and how to love the environment; Our school is not so clean... that's why teachers always care about cleaning the classroom and schoolyards.*

Students' Perceptions at the end of the school year **-** From the analysis of the data obtained from the focus groups in the non-green school at the end of the school year and after completing the intervention program, it was found that students' environmental perceptions are less diverse. From the analysis of the students' answers to the question: "What does the concept "environment" means to you?, three categories were found: the environment as a physical place; The environment as a complex of natural and human-made factors; and the environment as a source of pleasure. Most answers tended to the anthropocentric approach and the approach that combines nature, man and society. The biocentric approach almost didn't appear in any answer. At the end of the school year compared to the beginning of it, the number of answers that supported the combining approach was greater.

Examples of students' answers: *The environment is a natural place that we live in with a lot of animals and plants and along with the family members and all the people in the world (physical space sustainability); The environment is a pleasant and beautiful place to enjoy and spend a lot of time (anthropocentric).*

From the analysis of the students' answers to the question: "What does the concept "natural environment" means to you?, two categories were found, which were the same categories that were found earlier this year, before transferring the intervention program: the environment as a natural place, untouched by humans, without damages to the environment; and the environment as a natural place where wild animals and plants live together.

Examples of students' answers: *The natural environment is the nature... without human damage... which means without environmental problems (sustainability); The natural environment is a place for people to live in... that includes animals... plants and everything else around.*

From the analysis of students' answers to the question: "What does the concept "artificial environment" means to you?, the two categories that were found earlier this year, before transferring the intervention, were also found at the end of the year: the environment that was touched by humans, they caused damages and built buildings; and the environment in which people live with domesticated animals and cultivated plants. At the end of the year, students referred more to the human damages to the environment and to the buildings they build in green areas and referred less to the existence of

domesticated animals and cultivated plants in the artificial environment. That is, the number of students who referred to the damages was bigger, and it was more likely a result of the intervention program through which students were exposed to more environmental problems that surround us.

Examples of students' answers: *Artificial environment is the environment that has a lot of buildings and streets and shopping centers and less natural places which means fewer trees, plants and animals; It is the environment that includes human-made things... it is an artificial environment.*

From the analysis of the students' answers to the question: "What does the concept " the quality of environmental" means to you?, two categories were found: descriptive approach (description of the environment); and an access to a specific and global environmental action (protecting and accountability for the environment). Very few students answered that question according to the descriptive approach. The number of students who answered this question and related to subject of the quality of environment as a specific and / or a global environmental action, was higher than at the beginning of the year. The students talked more about the need to protect the environment, maintaining plants and animals, maintaining cleanliness and personal responsibility of each individual to the environment.

Examples of students' answers: *Quality of environment is if the environment is pleasant and good to live in... or not (description); quality of environment means protecting the environment everywhere... especially cleaning at school... at home... in the neighborhood... everywhere (specific action).*

From the analysis of the answers to the questions that focused on referring to the issue of the environment at school, students stated that not all teachers refer to the environment. Students said, at the end of the year as well as at the beginning of the school year, that the science teacher and also the geography teacher are the only teachers that refer to the subject of the environment but at the end of the year, they said that the other teachers also relate to environmental issues but much less than the science and geography teachers. Such an answer did not appear at the beginning of the year in the focus groups. There were students who talked about the social education coordinator at the school that organized trips about environmental issues and school activities about environment as the cleaning day.

An example of a student's answer: *Most teachers refer the subject of environment... even the educators... but the teachers who refer to environmental issues the most are the science and the geography teachers... and sometimes religion teachers during religion classes.*

From the analysis of students' answers to the questions about the perceptions regarding the environmental program, students noted that the goals of the environmental program is to enrich the knowledge of the students, to strengthen the relation of students with nature, to encourage students to love nature, plants and animals, to teach students to keep clean at home, at school, in the immediate area and elsewhere. At the beginning of the school year, the students' answers were different. They referred more to the fostering of the school appearance, to planting trees, to devoting areas for animals and to conducting researches. There was no mention for environmental involvement, concern and love of environment. At the end of the school year, students referred more to the relation between human and nature, and to love and concern, other than enriching the knowledge, but there was no mention for wise utilization of resources such as recycling paper, bottles, cans and batteries and there was no mention for the damages that the human causes to the environment. Such answers appeared in students' answers from the green school at the beginning of the school year, and this indicates that an environmental program, such as the green school program, emphasizes the subject of wise utilization and recycling of resources. On the other hand this issue was not emphasized in the non-green school despite transferring the intervention program that was designed for teachers.

Examples of students' answers: *The goal of every environmental program is to teach us about the environment and to make us love nature and care about it and protect it; The environmental program is designed to expose us to the natural environment and to strengthen the relationship with nature and to love and care for all animals and plants so that they don't extinct in the future.*

From the analysis of the students' answers to the questions that refer to the expectations from the environmental program, students referred to knowledge, attitudes and environmental behavior. Although, at the beginning of the school year, they believed in the positive contribution of the environmental program but they did not know how to explain it. They managed to explain that the environmental program is designed to enhance the knowledge about environmental issues (cognitive), to improve students' thinking about the environment (affective), to encourage them to do activities for the environment (behavioral), to strengthen the bond with nature (affective) and to do good things for the environment behavioral. At the beginning of the school year, their thinking was concentrated on the physical appearance of the school but at the end of the school year their thought expanded to include knowledge, attitudes and behavior

An example of a student's answer: *I expected that environmental program will change our thinking about the environment and make us love more the environment... to assess the environment and to protect it... I think that the environmental program in our school helped us because that's*

exactly what happened... I felt that this year all teachers were interested in the subject of environment... not only science teachers.

From the analysis of the answers to the questions about environmental problems, it was found that students are aware of the environmental problems that exist in the school and in the immediate neighborhood. They spoke about the cleaning problem at school, the accumulation of garbage in the streets' tankers, the incineration of garbage in tankers, the toxic gases of the means of transport and the factories, the destruction of green areas for the purpose of construction, that is happening also at school, smoking, and extinction of plants and animals species. The answers were similar to the answers from the focus groups conducted at the beginning of the school year. The only issue that was added to students' answers in this respect, is the damage caused to plants and animals as a result of the daily activities of the people, and it is perhaps a result of exposing students to these problems through the intervention program that was transferred to teachers at the same school. There was no reference to the maintenance of cleanliness in public places even though there was a reference to this matter in the green school at the beginning of the school year.

Examples of students' answers: *The activities of the humans always cause damages... everything that humans do... good or bad... causes damages to plants and animals... sometimes people do things that cause to the extinct of animals and plants... other damages that humans cause are the air and the water pollution; There are a lot of problems in nature... the most common problem, and that I hate a lot, is the garbage problem and not maintaining cleanliness in city streets.*

Regarding the subject of responsibility, two categories were identified in the students' answers: self-accusation; and accusing other. Most of the students accused themselves, the teachers, the director, their parents, that is, each individual that lives in the society. They stated that every person who lives in the society is responsible for what happens to the environment and that everyone can harm and can prevent harm. Very few students have accused others, such as the students from different classes, children in the neighborhood, people away from them, and especially the municipality. They claim that they care about the environment but others don't. The answers were similar to the answers at the beginning of the school year, although there was a clear tendency to blaming the self and not the others. There was no sign in students' answers of a good relation with the city.

Examples of students' answers: *All people are responsible for what happens in nature today... we and our families and all those who live in the city... we cause damages... we have to pay the price;*

That's true... we are responsible for most of the damages... but we didn't do it on purpose... There are people who deliberately cause damages... I do not do on purpose.

From the analysis of the students' answers to the questions about school action, it was found that students see that their school makes sure to teach students about environmental issues especially in the sciences and geography professions, cares for performing researches on environmental issues and cares about the external appearance of the school such as cleaning classrooms and yards just as they noted at the beginning of the school year. In addition, students stated that their school makes sure to protect the immediate environment of the school and the environment in general, and gave examples of students' activities in the immediate area and elsewhere, emphasizing the theme of trips in nature planned by social education coordinators at the school. There was no mention for recycling or participation of students' parents at school. The students have also mentioned the cleaning day and the waste collection day that were held at school. They spoke about power savings and about building benches from used materials. According to students' answers, it was very clear that the extent of environmental activity was greater than at the beginning of the school year before transferring the intervention program.

Examples of students' answers: *At our school we learn about the environment especially in science lessons... we also do research about environmental issues.... for example... the noise in the neighborhood and its effect on people; Our school looks nice and neat... classes are clean and yards are always clean except during breaks... but the teachers on duty always make sure that the students clean the yards at the end of the break...; We also save electricity... we turn off the lights before leaving the classroom... and we had the cleaning day... all students participated in cleaning all the school classes.*

Summary of the findings - It is very important to clarify the perceptions of those involved in EE from several assumptions: the ways in which people experience the environment and understand it, affect their environmental behavior and thus it is very important to decipher these understandings [75]. Students perceive the concept of environment in different ways according to the biocentric and the anthropocentric approaches that were described by Stern & Dielz [150] and the sustainability approach that was described by Wals [182]. Similar approaches were identified in the research of Loughland, Reid & Petocz [75]. Students from the non-green school referred to environment more as a source of enjoyment and relaxation compared to students from the green school who referred to environment as a set of biotic and abiotic factors. Most of the students referred to environment from a narrow ecological aspect which is compatible with the research of Shepardson, Wee, Priddy & Harbor

[141] who found that the prevailing perception is the perception of the environment as a natural place without human. Regarding the natural and the artificial environment, the students from the green school referred to the human act and students from the non-green school referred to the comparison between wild animals and plants and cultivated plants and domesticated animal. This shows that the science side is stronger in non-green schools compared to the strong environmental side in green schools.

Students from the non-green school noted that only teachers of science and geography refer to environmental issues however students from the green school noted that most of the teachers in their school refer to environmental issues. Teachers in green school usually receive training about environmental issues and sustainability consisting of four meetings [203]. When students were asked about the goals of environmental programs and the expectations from them, students from green school were able to better define the goals of the environmental program and the expectations from it according to the sustainability approach versus students from non-green school referred more to the appearance of the school and to the knowledge enrichment and did not refer to attitudes, affect and behavior. This shows that programs for sustainable education deal with both the conceptual and the practical level in four aspects: knowledge, skills, values, behaviors [201]. When the students from both types of schools were asked about the environmental problems that they are familiar with, they referred to local problems at school and neighborhood and did not refer to global problems. Regarding the cause for the problem, students from green school accused more the individual and the students themselves but students from non-green school accused others, such as the establishment and the municipality. This shows that the relationships between the non-green schools and the municipality are not good and that students believe that their lives and their decisions are controlled by a higher power versus students in green schools believe they are in control of themselves and their lives. Many studies have shown similar results [56; 57]. Regarding the school action, students from green school referred to action in a broader sense compared to students in non-green school who referred to action in a sense related to cleaning. At the end of the school year and after transferring the intervention program in the non-green school, the perceptions were less diverse and more according to the sustainability approach. The students' answers were less descriptive and deeper and this points to the positive impact of the intervention program. They noted that most of the teachers in the school refer to environmental issues. Regarding the goals of environmental programs, students referred, besides the knowledge enrichment, to the relationship between man and nature, to the love of nature and to the concern for the environment. At the beginning of the school year the students' mind was

targeted in knowledge but at the end of the school year it included knowledge, attitudes and behavior. In relation to environmental problems, students referred more to daily activities and human damages and in relation to the causes for the problems, students less accused the others and more accused themselves. Students refer to teachers as designers of behavior and as an example of personal involvement and action for the environment. When students talked about the school action they included more fields in their answers.

Perceptions of Teachers - Identifying teachers' perceptions in this research had contributed significantly to the understanding and analysis of the students' EL level and to planning and adapting training programs about environment for teachers in primary schools. Teachers' environmental perceptions and perceptions regarding the goals and the effectiveness of the environmental programs were tested through personal interviews. At first, perceptions of teachers from a green school and a non-green school will be displayed (before transferring the intervention program) and later, perceptions of teachers from the non-green school will be displayed again (after transferring the intervention program).

At the beginning of the school year, four interviews were conducted with teachers from a green school and four others were conducted with teachers from a non-green school. At the end of the school year, four interviews were conducted with the same teachers from the non-green school. During the interviews with the teachers at the beginning of the school year, a lot information was collected about the teachers' environmental perceptions and their perceptions regarding the environmental programs. From the analysis of teachers' answers to the question: "What does the concept "environment" means to you? three main perceptions were found: biocentric, anthropocentric and sustainability. The explanation of the biocentric concept is that the nature is in the center, the focus is on the biosphere and the natural ecosystems, the biosphere needs and right of all the organisms to live, are of utmost importance, and human needs are secondary. The explanation of the anthropocentric concept is that the human is in the center, his needs and his rights are the first in order and the environment was designed to meet his needs. The explanation of the concept sustainability is that the interactions between man, nature and society are in the center, that is, a combination of nature and human relations and understanding the complex interactions between human and natural systems. In the green school, three teachers referred to the environment according to the sustainability approach and one teacher referred to the environment according to the biocentric approach. In the non-green school one teacher referred to the environment according to the sustainability approach, two teachers referred to the environment according to the anthropocentric perception and one teacher

referred to the environment according to the biocentric approach. Distribution of teachers' perceptions regarding the concept "environment" is presented below, table 3.28.

Table 3.28 - Distribution of teachers' perceptions regarding the concept "environment"

School type / period	Biocentric approach	Anthropocentric approach	Sustainacentric approach	Total
Non-green / Pre	1	2	1	4
Green / Pre	1		3	4
Non-green / Post		2	2	4

The perceptions in the non-green school were more diverse and in the green school they tended to the sustainability approach.

An example of a teacher's answer from the green school: *The environment is... it depends on how we look at it... in my opinion the environment includes nature... the people who live in it... the situation in which they live... the way they relate to the environment... what they take and what they give to the environment... and how they affect the environment... that is... the environment is a set of relationships between people... society and nature* (sustainability).

An example of a teacher's answer from the non-green school before transferring intervention: *The environment is a source of the beauty in our lives... the environment gives us inspiration to go on living... without the environment we cannot go on living... the environment is a pleasant place where we should spend time and escape from the stress* (anthropocentric approach).

At the end of the school year, after transferring the intervention program in the non-green school, two teachers referred to the environment according to the sustainability approach and two others referred to the environment according to the anthropocentric approach.

An example of a teacher's answer from the non-green school after transferring the intervention program: *I think that the environment is not only the living beings or the inanimate things around us... which means not only the tangible things but also the intangible things... that is... the relations between the people themselves... the relations between people and all things in nature... their economic situation... their culture... their language* (sustainability).

From the analysis of the teachers' answers to the question: what does the concept "natural environment" means to you?, one category was found in both types of schools, at the beginning and at the end of the school year: an environment that was not touched by human or an environment without damage.

An example of a teacher's answer from the green school: *The natural environment is the environment in which everything is natural... the environment that was not touched by human... no buildings were built... no factories... no cars... no shopping centers... which means no damages... it's all natural... people live a simple life with animals... plants... clean air... and clean water* (sustainability). An example of a teacher's answer from the non-green school, before transferring the intervention program: *The natural environment is a beautiful environment... healthy... with no problems... no damage... all the creatures live properly without any interference... animals and plants are not in danger of extinction... everything is natural... there is nothing artificial* (sustainability).

From the analysis of the answers to the question: what does the concept "artificial environment" means to you?, only one category was found in both types of schools: an environment that was touched by human and caused damages to the environment and particularly by the construction. At the end of the school year, the same category was also found in the answers of all four teachers from the non-green school, in which the intervention program was transferred. Which means that teachers' conceptions regarding the natural and the artificial environment were the same in both types of schools and according to the sustainability approach.

An example of a teacher's answer from the green school: *The artificial environment is an environment that everything in it is not natural... that is... everything is made by humans... for example if we go to a public park... it's true we feel good and cozy... but we can tell it's not a natural environment... even the plants and trees... the human is the one who planted them and takes care of them... the benches and the children's games are a proof that the environment is artificial... there is nothing like nature... it's true that the park is a pleasant place but it is more pleasant in the natural environment*

An example of a teacher's answer from the non-green school: *When we look around us and see buildings... factories... houses... streets... traffic signs... cars... shopping centers... etc.... this is an artificial environment... when we do not see nature... we do not smell plants.... we do not see wild animals... we do not feel the clean air... so that's an artificial environment... it is an environment with noise and problems.*

From the analysis of the teachers' answers to the question: What does the concept" quality of environment" means to you?, three categories were found: the biocentric approach, the anthropocentric approach and the sustainability approach. Distribution of teachers' perceptions regarding the concept "quality of environment" is presented below, table 3.29.

Table 3.29 - Distribution of teachers' perceptions regarding the concept "quality of environment"

School type / period	Biocentric approach	Anthropocentric approach	Sustainacentric approach	Total
Non-green / Pre	1	2	1	4
Green / Pre	1		3	4
Non-green / Post		1	3	4

An example of a teacher's answer from the green school: *The concept "quality of environment", in my opinion, means safeguarding the environment and concern for the environment... the desire to live in a clean and healthy environment... and pleasant for everyone... quality of environment is not just what we see in the eyes... it also includes the situation in which the people live in in the environment... in terms of economy and culture... and the way they look at the environment and how they evaluate the environmental* (sustainability).

An example of a teacher's answer from the non-green school, before transferring the intervention program: *The quality of environment is when we talk about a clean and beautiful environment... and pleasant to live in... when everything is green... we need to protect the environment in order to be always clean and beautiful and livable* (anthropocentric approach). An example of a teacher's answer from the non-green school, after transferring the intervention program: *I believe that the quality of environment is about how good is the environment to all the parties that exist in it... the people... the animals... the plants... the water... the air... the earth.... everything... when all the factors are in good condition... so is the quality of environment... and vice versa... one factor in a bad condition is enough to cause a decrease in the quality of environment... everything depends on humans and society* (sustainability).

From the analysis of the teachers' answers to the question: what does the concept "environmental sciences" means to you?, three categories were found: science that investigates the relations between all living creatures in the environment; science that investigates the relations between humans and the biotic and abiotic factors in the environment; and science that investigates ways of protecting and preserving the environment.

At the beginning of the school year two teachers from the green school answered according to the first category, one teacher answered according to the second category and one teacher answered according to the third category.

In the non-green school, one teacher answered according to the first category, one teacher answered according to the second category and two teachers answered according to the third category.

At the end of the school year, in the non-green school, two teachers answered according to the first category and two teachers answered according to the third category. At the beginning of the school year, the perceptions varied between the biocentric, anthropocentric and sustainability approach, in both types of schools.

An example of a teacher's answer from the green school: *the environmental science field deals with the relations between all the living creatures in nature... for example... who eats who... who influences who... where is it appropriate to live and with whom ... what is the best environment for every creature.* An example of a teacher's answer from the non-green school: *In this field we learn how to preserve and protect the environment from the damages that humans make as a result of their activities... we learn how to behave in the environment in the smartest way in order to protect the resources for our children in the future.*

From the analysis of the teachers' answers regarding their environmental knowledge, awareness and action, different levels were found (table 3.30).

Table 3.30 - Teachers' level of knowledge, awareness and action at the beginning and at the end of the school year

Field	At the beginning of the year		At the end of the year
	Non-green school	Green school	Non-green school
Environmental knowledge	4 teachers – medium level	2 teachers – high level 2 teachers – medium level	2 teachers – high level 2 teachers – medium level
Environmental awareness	1 teacher – high level 3 teachers – medium level	3 teachers – high level 1 teacher – medium level	2 teachers – high level 2 teachers – medium level
Environmental action	1 teacher – high level 3 teachers – medium level	3 teachers – high level 1 teacher – medium level	3 teachers – high level 1 teacher – medium level

At the end of the school year two teachers admitted that their environmental knowledge has improved from medium to high thanks to the intervention program and one teacher stated that his environmental awareness level has improved from medium to high thanks to the intervention program. It is difficult to draw conclusions about the effectiveness of the program because of the small number of teachers that were interviewed and because of the small differences in levels according to teachers' reports.

An example of a teacher's answer from the green school: *I think I have a good environmental knowledge... at a high level... I obtained my knowledge alone from daily life ... my teaching profession is not related to environmental issues but it is always interesting to me to know more and more about the environment... I watch a lot of television programs about environmental issues... I am aware of many environmental problems that exist in our world today... I am very worried about the environment so I always try to do good things for the*

environment... I want my children to care about the environment so that they can live in a pleasant environment in the future. An example of a teacher's answer from the non-green school: *My environmental knowledge is good but I'm sure there are lots of things I do not know yet... there are a lot of environmental problems that I am aware of them especially those that exist in our residential area... but I am sure there are many problems in the world that I'm not aware of them... it's not because I'm not interested to know... but in my profession I don't encounter with environmental issues... I am very busy... I always try to save the environment... I love nature... I like to travel in nature... I don't always have time... but I always participate in activities that take place in school related to the environment.*

In order to identify teachers' perceptions regarding the goals of the environmental program, contribution and effectiveness of the environmental program, teachers in the green school were asked about the "green school" program that exists in their school and the teachers from the non-green school were asked about the environmental programs in general, that they know or that exist in other schools.

From the analysis of the teachers' answers to the questions about the goals of the environmental program, five categories were found: raising the level of knowledge (cognitive); raising the level of awareness (cognitive); strengthening the relationship with the environment (affective); encouraging environmental responsibility (behavioral); and nurturing the school and the neighborhood appearance (behavioral). Three approaches were found in the teachers' answers, the biocentric, the anthropocentric and the sustainability approach. Below, table 3.31 presents the goals of the environmental program according to the teachers' answers at the beginning and the end of the school year.

Table 3.31 - The goals of the environmental program according to the teachers' answers at the beginning and the end of the school year.

he question	At the beginning of the year		At the end of the year
	Non-green school	Green school	Non-green school
What are the goals of the environmental program according to your opinion?	1 teacher - increasing the level of knowledge 1 teacher -Strengthening the relation with nature 2 teachers - fostering the external appearance of the school and the neighborhood	2 teachers - increasing the level of knowledge, improving attitudes and environmental responsibility 2 teachers - Strengthening the relation with nature	2 teachers - increasing the level of knowledge, improving attitudes and environmental responsibility 1 teacher - Strengthening the relation with nature 1 teacher - Strengthening the relation with nature and fostering the external appearance of the school and the neighborhood

An example of a teacher's answer from the green school: *The green school program is a very important program because it enhances the students' environmental knowledge... it strengthens the students' relation with nature and it makes them more responsible through environmental projects outside the school and through a variety of activities inside and outside the class... such environmental plan will improve the environment in the school and will cultivate its appearance and the neighborhood appearance because some parents are involved in the program and because everything that the students learn is transferred to the family and is automatically transferred to the neighborhood... in this program students learn values* (sustainability approach).

An example of a teacher's answer from the non-green school: *The environmental program in general enriches the environmental knowledge of students and teachers... it exposes all who are involved in the program to important environmental issues and thus their environmental awareness level will increase... the program will also affect the parents indirectly even if they were involved or were not involved because everything that the students learn or do is transferred to the neighborhood and to the society in general... the environmental program is a very nice addition to the regular education program... it removes the students from the routine to the nature and it creates a good relation between the students and the environment in experiential methods and make them love the environment* (sustainability approach).

From the analysis of the teacher' answers to the question: do you think the "green school" program / the environmental program, will help improve the environment in the school and in the students' residential area? and how?, it was found that all the teachers in both types of schools agree that environmental programs help to improve the environment in the school and in the students' residential areas, and regarding the way in which the environmental program improves the quality of environment, four categories were found: through projects, adopting and fostering sites, outdoor activities that are related to environmental issues; through enriching the environmental knowledge and outdoor learning which raise the awareness and strengthen the relation with nature and the environmental responsibility; through activities inside the school space, nurturing the school appearance; and through parents' cooperation. According to the teachers' answers, two approaches were found, the biocentric approach and the sustainability approach.

From the analysis of the teachers' answers to the questions regarding teachers' expectations from the environmental program, it was found that all teachers, from both types of schools, had high expectations from the environmental programs at the level of students, teachers, school and

community. Three approaches were found in the teachers' answers: the biocentric approach, the anthropocentric approach and the sustainability approach.

An example of a teacher's answer from the green school: *I expect that the green school program will succeed and will continue to produce students with good environmental knowledge and awareness of environmental problems that exist in the country and the world... students who love and appreciate nature... students who know how to preserve the environment and how to behave in a responsible manner... not to cause dirt and not to cause harm to plants and animals... I expect that the school will look better and more beautiful as long as this program exists at school.* An example of a teacher's answer from the non-green school: *I think the environmental program will change the appearance of the school... it will change the atmosphere in the school... it will bring life to school because the environment is first of all a nature... this means we must make connections with nature through going out to nature or vice versa to bring nature to school... I'm sure this program will contribute much to the students... to the teachers... to the family... to the neighborhood... and if the municipality will cooperate then it will be a great success... I hope there will always be programs or activities on environmental issues in our school because it is a very important issue nowadays.*

The teachers in the green school were asked if there is anything that can improve the existing environmental program at their school and it was found that all the teachers prefer to share all the layers in all projects and activities at school and not to dedicate specific layers for each activity.

From the analysis of the teachers' answers to the question regarding the awareness of the environmental problems and the environmental action of the students, three categories were found: medium level of awareness and action; low level of awareness and action (but could be improved because the reason depends on the student himself); and low level of awareness and action (which is very difficult to improve because the reason depends on teachers and parents). Teachers from both types of schools indicated that students have low to medium level of environmental awareness, and low to medium level of environmental action. Below, table 3.32 presents the teachers' answers, regarding the environmental awareness and action of students in both types of schools at the beginning and at the end of the school year.

Table 3.32 - Awareness of environmental problems and environmental action of students according to teachers' answers.

The question	At the beginning of the year		At the end of the year
	Non-green school	Green school	Non-green school
What is the level of environmental awareness and the environmental action of students according to your opinion?	*2 teachers - low level of awareness that can be improved and low level of action *2 teachers - low level of awareness and low level of action, parents and teachers are to blame	*2 teachers - medium level of awareness that and medium level of action *2 teachers - low level of awareness that can be improved and low level of action	*2 teachers - medium level of awareness and medium level of action *2 teachers - low level of awareness and medium level of action, parents and teachers are to blame

An example of a teacher's reply green school: *In general level of environmental awareness of students is moderate but compared to the level before the program is definitely a good level ... As for the level of students' work for the environment I thought it acceptable in our society ... If we compare our children or our teachers and parents Western society So we conclude that we are not doing enough for the environment ... I know very well take advantage of the environment but still do not know to give the environment ... but if we as teachers or parents will encourage the students and will be an example for children level of awareness and action for the environment will improve with time. .. It is a long process that takes time.*

An example of a teacher's answer from the non-green school: *I think the students' level of environmental awareness is low and inadequate and also the level of action for the environment is low... I think that parents and teachers are the ones to blame... it's true that the environmental education begins at home but teachers as well as parents are responsible to enrich the students' environmental knowledge... to educate them to love... to appreciate and to respect the environment... and then to act responsibly for the environment... if we don't give that to students how can we expect them to know about the environment and to love and appreciate the environment... those are values that are not born with us... we have to worry to give them to students because they are our responsibility.*

From the analysis of the teachers' answers to the question: what do you do in your school for the environment?, two categories were found: recycling, adoption and fostering websites, performing researches, sharing parents (considering society and economy - sustainability); and specific action-cleaning yards and classes and cultivating school gardens. At the beginning of the school year, the teachers from the green school had more tendency to the first category and the teachers from the non-green school had more tendency to the second category. At the end of the school year the teachers in

the non-green schools had more tendency to the first category, but without mentioning recycling. Below, table 3.33 presents the teachers' answers regarding the environmental action in the school at the beginning and at the end of the school year.

Table 3.33 - The environmental action in the school according to teachers' answers at the beginning and at the end of the school year.

The question	At the beginning of the year		At the end of the year
	Non-green school	Green school	Non-green school
What do you do in your school for the environment?	4 teachers - specific environmental action (cleaning)	3 Teachers - recycling, adopting and fostering websites, researches, sharing parents *1 teacher – specific environmental action (cleaning)	*4 Teachers - adopting and fostering websites, researches, sharing parents

An example of a teacher's answer from the green school: *In our school we do a lot of things for the environment... we gather all kinds of plastic and glass bottles and cans and send them for recycling... we also collect used paper and send it for recycling... but last year we collected more bottles than this year... we need to work on this subject even more this year... our school always care about fostering and cleaning the school yards so that they look good and be comfortable and cozy for students... science teachers also perform researches about environmental issues as the research that was performed by the fifth grade students about the effect of burning trash in tankers on the people in the immediate neighborhood... in our school we also adopt a particular site in the city... we nurture An example of a teacher's answer from the non-green school; The issue of environment is a very important issue in our school so that's why we care a lot about cleanliness... we organize a special day for cleaning that includes cleaning classes and school yards... we always care about decorating and cleaning the school to make it a comfortable learning environment for students and teachers... and every day during recesses there is a group of students... on duty... who is responsible for cleaning the yards...it and clean it in cooperation with the municipality... and sometimes parents participate.*

From the analysis of the teachers' answers to the question: which environmental problems are known to you?, four categories were found: the accumulation of garbage, especially plastic products; air pollution, particularly of the means of transport; lack of green areas and especially because of the construction that causes damage to the environment; and people who do not recycle and separate waste. Teachers from both types of schools mentioned the same problems and in the non-green school there was no change in the teachers' answers between the beginning and the end of the school year. The results also suits the results of the questionnaires regarding the questions which were designed to

identify the students' awareness of environmental problems. Below, table 3.34 presents the familiar environmental problems according to teachers' answers at the beginning and at the end of the school year.

Table 3.34 - The familiar environmental problems according to teachers' answers at the beginning and at the end of the school year.

The question	At the beginning of the year		At the end of the year
	Non-green school	Green school	Non-green school
Which environmental problems are known to you?	2 Teachers - recycling 1 Teacher - accumulation of garbage, air pollution 1 Teacher - accumulation of garbage, lack of green areas	2 Teachers - recycling, accumulation of garbage, air pollution, lack of green areas 1 Teacher - accumulation of garbage 1 Teacher - air pollution	2 Teachers – recycling 1 Teacher - Accumulation of garbage, air pollution, lack of green areas 1 Teacher - accumulation of garbage, lack of green areas

An example of a teacher's answer from the green school: *The most familiar environmental problems to me from my residential area are the accumulation of garbage in the neighborhood and not maintaining cleanliness around houses... I know a lot of people who are very clean and their houses are always clean and shiny but around their house there are always heaps of garbage... they throw things they do not need outside the house and they do not care about the view around the house... I think it is a serious problem in our society... another very important issue is that people do not recycle... they throw a lot of products... especially plastic products that occupy a large area and distort the view... other than that... plastics and other materials do not decompose fast... they remain in landfills for ages... there are still many problems in nature... for example... the air pollution that is caused from the gases emitted from factories and transport and not to forget that all the problems are caused by people because they are the ones who build buildings and destroy green areas and destroy nature.*

An example of a teacher's answer from the non-green school: *There are a lot of environmental problems in the world and the main cause of these problems is human... we use the environment... we take from it what we want and we give back damages... for example when we build houses... shops and shopping centers... or when we make new streets... we destroy lots of green areas and thus we destroy plants and animals and distort the natural landscape and pollute the air and the water in all kinds of activities... we have no choice... we know we must do it... but we can reduce damages... it is always possible... another serious problem is in my opinion the amount of trash we produce at home... today we live in a modern era... we buy a lot of packaged products and we eat a lot of ready food and*

we throw a lot of products just like that... so the garbage accumulates everywhere because most products are not biodegradable and remain long time in landfills and it pollutes the environment... not all the are aware of this problem... If all people were aware of the problems the situation today was better.

From the analysis of the teachers' responses to the question: Who do you think is responsible for the environmental problems?, four categories were found: students themselves (inadequate behavior without responsibility); parents (home culture); teachers and school; and authorities (municipality). At the beginning of the school year, the teachers at the non-green school tended more to blame the municipality, and the teachers from the green school tended more to accuse students and their parents, but at the end of the school year the teachers from the non-green school, less accused the municipality and more accused themselves, the students and their parents. This may mean that the relation with the municipality has improved over the year or they understood better the individual responsibility imposed on them for the environment. Below, table 3.35 presents the responsible for the environmental problems according to teachers' answers at the beginning and end of the school year.

An example of a teacher's answer from the green school: *Regarding the environmental problems that exist in our residential area... I think the students and their irresponsibility for the environment are the main cause of the problems... and this is a result of the culture at home... parents are the ones to blame because if parents don't have good environmental education so there is nothing to give to their children... it begins first at home... it is true that school gives environmental education and they educate for environmental values but it is not enough... I'm not talking about problems caused because of construction or factories or transportation... I am talking about the everyday issues in our residential area... about our society... the Arab society... and our specific problems... and I do not think it's less important.* An example of a teacher's answer from the non-green school: *I think the number one responsible for the environmental problems in the world is us... humans... because everything we do causes harm... we derive much benefit from the environment and we use a lot of resources... but we give back only damage... the number of people who do good things for the environment is little... we... the Arab society... compared to the western society... must do more... the parents are also guilty because they do not teach their children how important it is to protect the environment... the children get whatever their parents give them... so I blame the parents and the students... the municipality is also guilty for the existing problems in our city because they do not struggle enough and the environmental issue is not the first in their priority list and they do not spend enough money on this subject.*

Table 3.35 - The responsible for the environmental problems according to teachers' answers at the beginning and end of the school year.

The question	At the beginning of the year		At the end of the year
	Non-green school	Green school	Non-green school
Who is responsible for the environmental problems in your opinion?	3 Teachers - students, family, teachers and municipality 1 Teacher - municipality	2 Teachers – students 2 Teachers – family	2 Teachers – students and family 2 Teachers – school and municipality

From the analysis of the teachers' answers to the question: Which environmental organizations or associations are familiar to you?, it was found in both types of schools, that half of the teachers are not familiar with associations or organizations that work for the environment and those who know mentioned the Ministry for the Protection of Nature and the Jewish National Fund. At the end of the school year, the four teachers who were interviewed knew more organizations (The Society for the Protection of Nature, the Ministry of Environment, the Nature and Parks Authority NPA, Israel is beautiful, the Green Authority) and it is likely because, as part of the intervention program, they were exposed to the organizations that work independently or in partnership with the Ministry of Education, with schools around the country.

Summary of the findings - Perceptions of teachers are very important because they are the key to the implementation of significant EE in the educational system and to the development of EL among students [86]. Perceptions of teachers identified in this research were also varied and parallel to the biocentric, anthropocentric and sustainability approaches. Teachers in green school perceive the concepts environment, natural environment and artificial environment more according to the sustainability approach however teachers from non-green school perceive the environment more according to the anthropocentric and biocentric approaches but at the end of the school year they had more tendency to the sustainability approach. Teachers in green school perceive themselves as owners of high level of environmental knowledge, environmental awareness and environmental experience. Teachers in non-green school perceived themselves, at the beginning of the school year, as owners of a moderate level of environmental knowledge, awareness and behavior but at the end of the school year, most of them perceived themselves as owners of a high level of environmental knowledge, awareness and behavior. Regarding the question about the goals of environmental program, the teachers' answers in green school included more fields while the teachers' answers in non-green school focused on knowledge, connection with nature and appearance of school and neighborhood. At the end of the school year, the teachers' answers included more fields such as responsible behavior and positive attitudes towards the environment. Teachers from both types of schools

had high expectations from the environmental programs. Teachers in green school see their students as owners of a moderate level of environmental awareness and environmental action. Conversely, teachers in non-green school saw their students, at the beginning of the school year, as owners of a low level of environmental awareness and environmental action, but at the end of the school year they saw them as owners of a moderate level of environmental awareness and environmental action and blamed themselves and their parents. When teachers were asked about the school action, teachers from green school referred in their answers to the society and the economy but teachers from non-green school referred to specific actions but at the end of the school year they referred also to society and economy. Teachers from both types of schools were aware of environmental problems and referred more to local problems. Regarding the causes for the environmental problems, teachers from the green school accused students and their parents and teachers from the non-green school, at the beginning of the school year, more accused the municipality but at the end of the school year they less accused the municipality and more accused themselves, the students and their parents. Regarding the goals of the environmental programs, most teachers, at the end of the school year, stated objectives of strengthening knowledge, attitudes, behavior, values, and affinity to environment. These aspects are the basic components of EL [107;123]. According to Orr [107], education for EL is the proper way to implement EFS. Teachers from both types of schools were not aware of organizations and agencies that work for the environment, apart from the Ministry for the Protection of Environment and the Jewish National Fund, but at the end of the school year they were aware of more organizations. According to the above findings, the obvious difference that existed between the green school and the non-green school at the beginning of the school year stems from a lack of teachers' training in environmental issues. This conclusion was received in many studies that show that insufficient EE in teacher training is one of the obstacles of the successful implementation of the EE in schools [21;66;85;86;167].

In summary, it is very clear that the students' perceptions are equivalent to the teachers' perceptions at the same school and that indicates that students' perceptions are affected by the teachers' perceptions. Therefore, if the main goal of EE is the EL then the start should be with teachers who are in daily contact with the students and have the greatest impact on them. Perceptions of teachers are very important because they are the key to the implementation of significant EE in the educational system and to the development of EL among students.

3.4. Conclusions to the third chapter

This research was designed in order to examine the impact of EE programs on sixth grade students' EL in the Arab sector of Israel. Also, to identify environmental perceptions and perceptions

concerning the effectiveness of the environmental programs, of the students and the teachers involved. This research is a mixed method research. Evaluating the students' El level in all its components (knowledge, attitudes, affect, behavior and skills), the relation between EL and background variables and correlation between all the EL components was done through a quantitative analysis. Identifying perceptions of students and teachers was done through a qualitative analysis. According to researchers of this domain, EL is an outcome of EE programs and initiatives and a fundamental goal of EE. The main theoretical basis of the study is EE according to the EFS / ESD approach which is considered today a leading stream in the EE. The sustainability approach combines discussions about social issues such as human development, the citizen rights, equal rights and social justice as part of the design of a sustainable society, which preserves well the natural resources. The study attempted to examine the impact of EE programs on the students' EL and focused on the "green school" program and the intervention program developed by the researcher specifically for this research. The intervention program was designed for teachers, who are in daily contact with their students, for the purpose of raising the students' EL level. Many studies have examined the impact of environmental programs on EL and correlations between the EL components. Several researchers found out that some of the environmental programs affected certain components and some did not affect at all. The findings of this study indicate that the "Green school" program had no significant effect on the components of the EL among students however the intervention program, that was specially designed for teachers, had almost the same effect and in some dimensions the effect on EL was slightly larger. This reinforces the claim of several researchers, that the relations between the dimensions of EL are complex. Also, several researchers found a high correlation between the EL components. However other researchers claimed that this connection has not been substantiated in many studies. In this research a moderate correlation was found between attitudes, affect and behavior. Also, several researchers found an impact of some of the background variables on EL and others did not find a relation at all. In this research no significant impact was found concerning the students' background variables. However, diverse sources of knowledge contribute more than one single source, to increase the students' EL level.

Regarding the environmental perceptions, it was very important in this research to identify the students' and the teachers' environmental perceptions and perceptions concerning the effectiveness of the environmental programs. Identifying perceptions and interpreting them helped understanding how students and teachers relate to environment and environmental programs. Also, it reflected their understanding regarding the objectives of EE. Accordingly, the qualitative research question focused

on identifying environmental perceptions and perceptions regarding environmental programs, of students and teachers participating in the research. The students' environmental perceptions, in the green and the non-green school, in general, tended more to the biocentric and the anthropocentric approaches, probably because of their age. They are not mature enough to think according to the sustainability approach. However, at the end of the school year, the students' perceptions, in the school with the intervention program, tended more to the sustainability approach comparing to the beginning of the school year. This assures the positive impact of the EE programs on the students' perceptions. The teachers' environmental perceptions, in the green and the non-green school, were also diverse between the biocentric, the anthropocentric and the sustainability approach. However, at the end of the school year, the teachers' perceptions, in the school with the intervention program, tended more to the sustainability approach. This also assures the positive impact of the EE programs on the teachers' perceptions. It is very important to identify teachers' perceptions, in order to design and develop effective training courses, especially for teaching staffs, that aim, at the end, to raise the students' El level.

In summary, the intervention program can serve as an example of an effective EE program that can positively affects the students' EL, and the students' and the teachers' perceptions, according to the sustainability approach. Which means, encouraging a lifestyle that depends on a development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

Trough our research we found that the general level of environmental knowledge is insufficient. Most students in primary schools in the Arab sector are not exposed to the field of environmental knowledge in an adequate form. The green-school program has positively influenced the knowledge; however the positive effect of the intervention program was greater on knowledge.

The important scientific problem solved in the research was to analyze the theoretical and methodological aspects of the impact of the ecological literacy programs on the students from the sixth grade in the Arab sector from Israel and ecological perceptions of students and teachers about them in terms of harnessing the intervention program for teacher training in environmental education field in order to streamlining sustainable approach of the environmental behavior.

1. Studying literature and international documents, we identified the vital importance of environmental education in general and relevance of constructive attitudes of students towards the environment. In general, students' attitudes towards the environment are positive, they expressed

positive attitudes towards the environment and solidarity with environmental values associated with the protection of environment. Attitudes of students in green schools were a little more positive than the attitudes in the rest of the schools, especially concerning green consumerism. The intervention program did not improve the students' attitudes as did the green school program but at the end of the school year the results were similar.

2.   The ecological literacy methodology was oriented to determine the impact of the "Green School" on environmentally positive attitude, which was higher than the impact of non-green curriculum in schools. The impact of the green school program on the environmental affect was adequate but not greater than the impact of the curriculum in non-green schools. The regular curriculum had greatly contributed to the environmental affect of students. The intervention program had a positive impact on the students' environmental behavior.

3.   The level of environmental behavior, in general, is inadequate. There were no differences in the level of behavior between green schools and non-green schools but in green schools the students' behavior included more fields. The intervention program had no significant effect on behavior.

4.   The level of skills concerning environmental issues in general is inadequate. The intervention program had a positive impact on skills and especially on the ability to suggest a suitable and correct solution to the environmental problem, but compared with other types of schools, the difference was not significant.

5.   The environmental awareness level, in all types of schools, at the beginning of the school year, was relatively moderate. The level increased in all types of schools but it increased the most in the green schools. The effect of the intervention program on awareness was positive. In general, the impact of the intervention program was almost identical to the impact of the green school program. Also, a connection was found between the environmental awareness level and the EL level, especially with affect and skills components. There is a gap between the environmental knowledge and the rest of the EL components. A high level of Knowledge, concerning environmental issues, does not necessarily bring positive attitudes, positive affect and positive behavior for the environment.

6.   A moderate correlation was found between attitudes and affect and between attitudes and behavior. A moderate correlation was also found between affect and behavior. Students with positive attitudes and positive affect reported about more positive behavior for the environment .In general, no significant correlation was found between EL components .The relation between EL and background variables is limited. No significant of background variables on EL was found. However, regarding the

source of knowledge, the school is considered to be an important source of environmental knowledge in order to raise the students' level of EL. After school comes the television followed by the computer. Diverse sources of knowledge contribute more than a single source of knowledge source to the increasing of the students' EL level.

7. According to the almost identical results between the green and the non-green schools, it is most likely that within the fields of science and geography, environmental issues are integrated in the formal school curriculum, however the students in both types of schools, green and non-green, are exposed a little to environmental issues and this exposure is with a scientific focus and not with an environmental focus. This means the goals of the program and the methods of teaching and learning must be adjusted to the needs and the perspectives of the community, approached in a holistically way.

8. The environmental programs that were examined in the research, the green school program and the intervention program, that was developed specifically for this research, had a positive effect on the EL components but the overall level of EL is still not sufficient.

9. Students' perceptions indicate differences related to EE: the fact that students from the green school referred to the environment according to the sustainability approach more than the students from the non-green school shows a lack of dealing with the subject of environment in the curriculum. Highlighting the issue of cleanliness in the non-green school versus highlighting the subject of the need and the responsibility of society to take care of the natural resources in the green school shows the difference in the EE level taking place in schools. Students' environmental perceptions identified in this research were mostly parallel to the biocentric and the anthropocentric approaches and a little part of them were parallel to the sustainability approach. The reason may be because of the age of the students. They are not yet ripe enough to reply according to this approach. Regarding the environmental problems, students in the non-green school more accused the establishment or the municipality and less accused themselves however students in green school referred to the personal responsibility of the individual in the society. This shows that the relationships between the non-green schools and the municipality are not good and it also shows that students believe that their lives and their decisions are controlled by a higher power versus students in green schools believe that they control themselves and their lives. At the end of the school year and after transferring the intervention program, the students' perceptions tended more to the sustainability approach and this insures the positive impact of the program.

10. Teachers' perceptions were also diverse and parallel to the biocentric, anthropocentric and sustainability approaches. From the analysis of the teachers' perceptions, it was found that there is a need to deepen the understanding of teachers regarding environmental issues through appropriate training. Proper training can contribute a lot to teachers, to students and to the school climate. At the end of the school year, most teachers stated goals of strengthening knowledge, attitudes and behavior, values and affinity to environment. These aspects are the basic components of the EL. Most teachers stressed the importance of the environmental programs designed for teachers. This insures the positive impact of the intervention program. Raising teachers' awareness and their participation, has contributed to the raising of the students' EL which is considered as a key target of the EE.

Final conclusion: The intervention program can pose an example of an educational program that promotes EE according to the sustainability approach, and aims to raise the students' EL level.

RECOMMENDATIONS

The research findings and conclusions raised many interesting questions which can be answered in other researches. I recommend on several possible directions.

Decision Makers' Level:

- To develop a multi-year training program for the educational staff in school that is based on the same criteria of the proposed intervention program in the research.

- To develop a special environmental program that aims to strengthen the skills of the students concerning environmental issues and particularly the issue of dealing with environmental problems and proposing solutions to problems.

- To increase the commitment of the Ministry of Education to the subject of EE and to the implementation of sustainable policies in primary schools in the Arab sector.

- To prepare updated and available teaching materials on environmental issues in Arabic language for the teachers in the Arab sector.

- To examine in depth the existing environmental programs in order to ensure that in the future they will provide the maximum educational benefit.

Schools' Level:

- To trace the impact of the green school program and to perform the same comparison between green schools and non-green schools in other areas of the country in the Arab sector.

- To transfer the same intervention program to other schools (with and without environmental programs) and to examine its impact on the EL of students.

- To examine the level of EL in private schools and to compare with governmental schools in the Arab sector.

Teachers' Level:

- To train the educational staff in school to a teaching that combines EE according to the sustainability approach.

- To deepen the identification of the perceptions and the attitudes of the educational staff at school because it contributes to the development of appropriate environmental training programs in the field of EE and to the raise of the students' EL level.

Students' Level:

- To examine the impact of home culture on the students' EL.

- To expose all the students in school to the subject of environment by incorporating the subject in all the teaching professions.

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Appendices

<div align="right">**Appendix (1)**</div>

Glossary of terms

Environmental Education (EE)

An educational process that is performed in a formal and non-formal framework, whose goals are to provide knowledge about the physical and the human-social environment, to strengthen the affinity and the appreciation towards the environment, the human and the society, to develop skills that allow to act for the physical and human-social environment and to make decisions that takes into account human and environment (UNESCO, 1978; NAAEE, 2001).

Environmental Literacy (EL)

The ability to perceive, to understand and to interpret the relative balance of the ecosystems, as well as to act in order to maintain or improve these systems (Disinger &Roth, 1992. 2003).The ability to understand the nature of the relationship between humans and between them and the natural systems and to know how to act in order to preserve the environment according to the spirit of sustainability (Orr, 1992).

Education for Sustainability/Education for Sustainable Development – EfS/ESD

An educational approach that applies the principles of sustainable development, emphasizing the interaction between society, economy and environment. The main goal of this approach is to look at the future while thinking how to achieve a better quality of life and prevent the appearance of problems. This approach focuses on human development in issues of equal rights, environmental justice and social and economic concern [152].

Sustainable Development

A development that meets the needs of the present without compromising the ability of future generations to meet their own needs. A development in which there is a balance between the resources utilization rate and their renewal rate through natural processes (UNESCO, 2002; WCED, 1987).

Sustainability

Sustainability is a world view and a way of life that seeks to realize the environmental, social and economic needs of all people while maintaining the right of the future generations to fulfill their needs. Sustainability is a democratic and optimistic point of view that considers the human dignity and freedom, as the most important element. Sustainability is the ability to continue in a particular situation or a particular process steadily and stably for a long time (Israel Ministry of Environmental Protection Site).

Outdoor Learning/Out-of-School Learning

Each learning mode that takes place outside the classroom or in an enclosed space (Tal & Morag, 2009).

Place-Based Education

An educational approach that emphasizes creating the contact to a certain place and the learning in the context of that place. An education based on a direct and multi-dimensional experience in the environment (Gruenewald, 2003).

A Learning Teachers' Room in Environmental Education

All the teachers at the school are participants in a program about various environmental issues and regularly attend it. All teachers combine Environmental Education in all fields of teaching (Tal, T. et al., 2009) .

A permit for performing the research from the Chief Scientist (in Hebrew)

מדינת ישראל
משרד החינוך
לשכת המדען הראשי

12 נובמבר 2014
י"ט חשון תשע"ה
תיק 8257 רו 798

היתר להפעלת התערבות ולאיסוף מידע על אודותיה לצורך המחקר בנושא

"הערכת תכניות לפיתוח אוריינות סביבתית לתלמידים בבתי-ספר יסודיים במגזר הערבי"

בביצועה של גב' ראניה שלש

ההיתר בתוקף החל מהתאריך הרשום לעיל ועד לסיום שנת הלימודים תשע"ו בלבד

במסמך זה ההתייחסות לכל אלה שלא אלה מזווהים לפי שם, היא בלשון זכר. זאת מטעמי נוחות בלבד, כאשר הכוונה היא גם לנקבה

לצורך הכניסה לבית הספר יומצא העתק של מסמך זה למנהל
העתק של החיתר יומצא לעיונם של המורים המשתתפים במחקר

המסגרת שבה נערך המחקר: עבודת גמר לתואר שלישי של עורכת המחקר באוניברסיטת 'מולדובה'
(State University of Moldova)

מטרת המחקר: בחינה השוואתית של האוריינות הסביבתית[1] של תלמידים בבתי ספר יסודיים במגזר הערבי, תוך השוואה בין שלוש קבוצות אלה: (א) בתי ספר ירוקים': בתי ספר שבהם מופעלות דרך קבע תכניות התערבות שנועדו להגביר את המודעות לשימור הסביבה; (ב) בתי ספר שאינם ירוקים': בתי ספר שלא מופעלת בהן כל תכנית בנושא הנבדק; (ג) בתי ספר שאינם ירוקים' ושבהם ישתתפו המורים בהשתלמות בנושא הנבדק.

עיקרי המרכיבים של המחקר לעניין היתר זה:
הנבדקים:
קבוצת הניסוי: תלמידי כיתות ו' ומוריהם בבתי ספר במגזר הערבי שאינם ירוקים' ושבהם תקיים עורכת המחקר השתלמות בית ספרית למורים בנושא 'איכות הסביבה'
קבוצת השוואה 1: תלמידי כיתות ו' ומוריהם בבתי ספר במגזר הערבי שאינם ירוקים' ושבהם לא מופעלת כל תכנית בנושא איכות הסביבה
קבוצת השוואה 2: תלמידי כיתות ו' ומוריהם בבתי ספר ירוקים' במגזר הערבי.

מערך המחקר, כלי המחקר והליך לאיסוף המידע:
קבוצת הניסוי
א. המורים

עורכת המחקר תנחה את המורים בנושא העומד לבדיקה במסגרת השתלמות בית ספרית שתתבצע במהלך שנת הלימודים. לפני ההשתלמות ולאחריה ייערך עם המורים ריאיון בנוגע לתפיסותיהם בתחום 'החינוך

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[1] 'אוריינות סביבתית', כפי שמוסברת בהצעת המחקר, מתבטאת בעיקרה במודעות לחשיבות שימורה של איכות הסביבה, לדרכים שיש לנקוט לצורך שימורה ולסכנות הכרוכות באי נקיטת הפעולות הנחוצות לשימור הסביבה.

הסביבתי ובנוגע לציפיותיהם מהההשתלמות (בראיון הראשון) ומידת מימושן (בראיון השני). כמו כן, המורים יתבקשו לספק לעורכת המחקר עותק ממערכי שיעור, שאותם הכינו במהלך ההשתלמות.

הראיונות יתועדו באמצעות הקלטת שמע. במסגרת הריאיון יתבקש המורה להזדהות. כמו כן, על גבי מערכי השיעור שיימסרו יתבקשו המורים לרשום את שמם. כל זאת, לצורך הצלבת המידע, הנדרשת לצורכי המחקר, בין הראיונות לבין מערכי השיעור.

ב. התלמידים

לפני ההשתלמות ולאחריה יתבקשו התלמידים למלא שאלון שנועד לבחון את אוריינותם הסביבתית. כמו כן, בתחילת השנה ולקראת סיומה יתבקשו הנבדקים להשתתף בשיחה כיתתית בנוגע לתפיסותיהם בתחום החינוך הסביבתי.

קבוצות ההשוואה

א. המורים

המורים יתבקשו להשתתף בריאיון (בנקודת זמן אחת) על תפיסותיהם בתחום החינוך הסביבתי. תיעוד הריאיונות ייערך בכתב.

ב. התלמידים

התלמידים יתבקשו למלא שאלון ולהשתתף בשיחה כיתתית, שמתכונתם זהה מבחינת העיתוי ומבחינת התוכן לזו של הפעולות שמתוכננות להיערך בקרב התלמידים בקבוצת הניסוי.

הבקשה לביצוע המחקר הנ"ל נבדקה על ידי לשכת המדען הראשי, תוך בחינתה של ההשתלמות למורים המבוקשת שלעיל על ידי יחידת המשרד הנוגעת בדבר, ונמצאה עומדת בכל התנאים הנוגעים בדבר הקבועים בנוהל "אישור איסוף מידע במוסדות החינוך". לאור זאת הוחלט להתיר את הפעלת ההתערבות ואת איסוף המידע המבוקש שלעיל על אודותיה בקרב תלמידים בכיתות ו' ומוריהם בבתי ספר ממלכתיים במגזר הערבי במחוז הצפון.

ההיתר כפוף לכל התנאים האלה:

א. הסכמת מנהל בית הספר להפעלת תכנית ההתערבות למורים בנושא הנבדק במסגרת השתלמות בית ספרית על ידי עורכת המחקר.

ב. כל התנאים הנוספים המפורטים להלן אשר אותם על עורכת המחקר לקיים, בשיתוף עם הנהלת בית הספר הנוגע בדבר:

1. המורים המועמדים להשתתף במחקר אינם כפופים לעורכת המחקר והם
והתלמידים המועמדים ליטול בו חלק אף אינם תלויים בעורכת המחקר בכל דרך אחרת.

2. איסוף המידע בפועל לא ייערך על ידי בעל תפקיד בבית הספר או על ידי תלמיד הלומד במוסד.

3. הפעלת ההשתלמות למורים, ריאיון המורים והנחיית השיחה הכיתתית בקרב התלמידים- כל

אלה ייערכו בפועל על ידי עורכת המחקר בלבד.

4. ככל שהעברת השאלון לתלמידים ואיסוף עותק של מערכי השיעורים מהמורים מתוכננים להתבצע על ידי נציגים של עורכת המחקר יהיה עליהם להציג מנהל בית הספר ייפוי כוח הנוגע בדבר בחתימתה.[2]

5. תכובד זכותם של כלל התלמידים והמורים המועמדים להיבדק שלא להשתתף בפעולות איסוף המידע המבוקשות (כולן או חלקן) וזכותם להפסיק את השתתפותם בפעולות הנ"ל שלב מבלי שייפגעו מהחלטותיהם בכל דרך. כל זאת יובהר לתלמידים ולמורים המועמדים להיבדק על ידי עורכת המחקר לפני תחילת איסוף המידע בכל אחת מנקודות הזמן שבהן ייערך.[3]

6. המורים הנבדקים בקבוצת הניסוי:

א. בהשתלמות ובפעולות איסוף המידע על אודותיה ישתתפו אך ורק אותם המורים שהביעו את הסכמתם בכתובים להשתתפותם בהשתלמות ובפעולות איסוף המידע שלעיל. לצורך קיום תנאי זה תיערכנה פעולות אלה:

א1. עורכת המחקר תספק להנהלת בית הספר את הכמות הנחוצה של מכתבי הפנייה למורים , שנועדו לבקש את הסכמתם לפעולות שלעיל (מצ"ב הנוסח של המכתב ושל כתב ההסכמה, עם חותמת לשכת המדען הראשי, שאותם יש להפיץ בקרב המורים).[4]

א2. הנהלת בית הספר תסדיר את הפצת מכתבי הפנייה וכתבי ההסכמה למורים.

א3. המורים אשר מסכימים להשתתף בהשתלמות ובאיסוף המידע המבוקש על אודותיה יחזירו את כתבי ההסכמה החתומים על ידם להנהלת בית הספר; זו תמסור אותם לעורכת המחקר ותשמור העתק שלהם ברשותה.[5]

ב. המורים יונחו שלא לציין במהלך הריאיונות כל פרט מזהה על אודות בעל תפקיד כלשהו מלבדם או על אודות תלמיד. אם בגלל טעות, או בגלל ההקשר שבו נאמרו הדברים הוקלט פרט מזהה על אודות אדם כלשהו שאיננו הנבדק עצמו, יימחק פרט זה מההקלטה על ידי עורכת המחקר מיד עם תום הריאיון.

7. המורים הנבדקים בקבוצת ההשוואה:

הנבדקים יונחו שלא לציין במהלך הריאיון כל פרט מזהה על אודות עצמם או על אודות כל אדם אחר ולא יירשם על אודותיהם כל פרט מזהה על ידי עורכת המחקר.

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[2] במקרה שאיסוף המידע יתבצע על ידי נציגים של עורכת המחקר יחולו עליהם כל תנאי חתיותר בהתייחס לפעולה המתבצעת על ידם ושנקבע כי יחולו על עורכת המחקר.

[3] למורים בקבוצת הניסוי יובהרו זכויות אלה כמו גם זכויותיהם בנוגע לחישתתפות בהשתלמות במסגרת המכתב המופנ בקרבם.

[4] בהעדר הסכמת מורים אין לאפשר לעורכת המחקר גניסות לפרטים מזהים כלשהם על אודות המורים שהיו נחוצים לה לצורך הפצת המכתבים בכוחות עצמה.

[5] כתבי ההסכמה יישמרו על ידי הנהלת בית הספר ובאחריותה בארון נעול לתקופה של שלוש שנים לפחות.

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מדינת ישראל
משרד החינוך
לשכת המדען הראשי

8. **התלמידים הנבדקים בקבוצת הניסוי ובקבוצת ההשוואה:**

א. התלמידים יונחו שלא לציין בשאלונים שימלאו כל פרט מזהה על אודותיהם ולא יירשם על אודותיהם כל פרט מזהה על ידי עורכת המחקר.

ב. במהלך השיחה הכיתתית עורכת המחקר לא תרשום כל פרט מזהה על אודות תלמיד או על אודות כל אדם אחר.

ג. תיעוד השיחות הכיתתיות עם התלמידים ייערך בכתב בלבד.

ד. לצורך הצלבת המידע בין שני השאלונים שימלא התלמיד יתבקש המורה לרשום על גבי השאלונים, לפני תחילת איסוף המידע, את מספרו הסידורי של התלמיד לפי יומן חביתה ולחלק את השאלונים לתלמידים לפי צופן זה.

ה. איסוף המידע מהתלמידים ייערך במסגרת כיתתית במהלך יום הלימודים, בתאום עם המורה.

ו. איסוף המידע מהתלמידים לא יארך יותר משתי שעות לימוד (120 דקות) בסך הכול.

ז. בעת מילוי השאלונים תכובד זכותם של התלמידים הנבדקים לפרטיות. לשם כך, בין היתר, ימסרו התלמידים את השאלונים שמילאו <u>ישירות</u> לידי עורכת המחקר.

9. בעת הכניסה לבית הספר על עורכת המחקר לשמור על הופעה ההולמת את המקובל במוסד החינוכי.

<u>עוד יובהר כדלהלן:</u>

- עורכת המחקר התחייבה בכתובים לפני לשכת המדען הראשי:

א. לשמור בקפדנות על החיסיון של הנתונים המזוהים שייאספו במסגרת המחקר ולהשמיטם לצמיתות מייד עם תום עיבוד הנתונים, ובכל מקרה לא יאוחר מהתאריך 01.08.16, במועד המוקדם מבין השניים.

ב. לא לפרסם את ממצאי המחקר באופן שיאפשר את זיהוי הנבדקים.

- ההיתר ניתן אך ורק להפעלת ההתערבות ולאיסוף המידע על אודותיה באמצעות כלי המחקר שהוצגו לבדיקה ללשכת המדען הראשי, במתכונת שהותרה לביצוע.

- ככל שקיימות זכויות יוצרים בנוגע לכלי המחקר או בנוגע לתשובות או לתוצרים האחרים של הנבדקים הנוצרים במסגרת המחקר ו/או הנמסרים לעורכת המחקר במסגרתו, באחריותה הבלעדית של עורכת המחקר להסדיר את הנושא בהתאם לכל הוראות החוק/ים הנוגע/ים בדבר.

- אין במסמך זה משום חיווי דעה של לשכת המדען הראשי על איכותו של המחקר.

- לא נדרש היתר נפרד מטעם המחוז.

רנה אוסיון
מרכזת בכירה (בקרה ומעקב)

תפוצה:
גבי ראויה שלש , קישון 1/18, נצרת עלית
מנהלת המחוז שלעיל

4   http://www.education.gov.il/scientist :אתר הבית   טלפון 02-5602957/8   גויין לב רם רחי דבורה הנביאה 2 ירושלים 91911
פקס 02-5602955   דואר אלקטרוני scientist@education.gov.il

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A written consent for teachers for participating in the intervention program (in Hebrew)

שנת הלימודים _____

תאריך: _____

למורה שלום,

הנדון: בקשה להשתתפותך בתוכנית התערבות בנושא 'חינוך סביבתי' ובאיסוף מידע על אודותיה לצורכי מחקר

הנני סטודנטית לתואר שלישי בחינוך באוניברסיטת מולדובה ("State University of Moldova") ועורכת מחקר בנושא "הערכת תכנית לפיתוח אוריינות סביבתית בקרב תלמידים בבתי-ספר יסודיים במגזר הערבי".

מטרתו המרכזית של המחקר היא להעריך את רמת האוריינות הסביבתית של תלמידי כתות ו' בבתי-ספר יסודיים במגזר הערבי, תוך השוואה בין בתי-ספר 'ירוקים' (בתי ספר שבהם מופעלות תכניות להגברת המודעות לשימור הסביבה) לבין בתי-ספר רגילים (בתי ספר שבהם לא מופעלות תכניות בנושא הנ"ל). כמו כן, אבקש לבחון את השפעתה של תכנית התערבות למורים בנושא 'חינוך סביבתי' על רמת האוריינות הסביבתית של תלמידיהם.

בית הספר היסודי '_____', שבו אתה מועסק מתוכננת העברתה של תכנית ההתערבות שלעיל למורים (להלן 'ההשתלמות').

ההשתלמות תתקיים, בהסכמת מנהל בית הספר, במסגרת 12 שעות המיועדות לישיבות הצוות השבועיות בהנחייתי. התכנית תתקיים לאורך שנת הלימודים במסגרת השעות הנ"ל.

יש לי ניסיון בהנחיית מורים במסגרת השתלמויות בית-ספריות וכן ניסיון וידע בשילוב תכניות לחינוך סביבתי בבתי-ספר יסודיים ועיצוב סביבות למידה. זאת, במסגרת תפקידי כרכזת תכניות לחינוך סביבתי בבתי ספר במגזר הערבי.

המורים שיסכימו להשתתף בהשתלמות יתבקשו, פרט לנוכחות במפגשי ההנחיה, לצפות בסרטים, להשתתף בסיורים, להכין מערכי שיעורים בנושא 'חינוך סביבתי' ולהעביר שיעורים לתלמידים בהתאם למערכים אלה.

לצורך בדיקת האפקטיביות של ההשתלמות יתבקשו המורים המשתתפים להשתתף באלה:

1. ריאיון, בהנחייתי, המתוכנן להתקיים לפני ההשתלמות, בנוגע לתפיסותיהם בתחום 'החינוך הסביבתי' וציפיותיהם מההשתלמות. הריאיון יתועד באמצעות הקלטת שמע.

2. ריאיון נוסף לקראת סיום שנת הלימודים, שבמסגרתו אבקש לעמוד על המידה, שבה מומשו הציפיות מההשתלמות מנקודת מבטו של המורה המשתלם. כמו כן, המורים יתבקשו להתייחס להשפעתה של ההשתלמות על התפתחותם המקצועית כמורים ועל יכולתם לשלב נושאים מתחום החינוך הסביבתי במקצועות הוראה שונים אותם הם מלמדים.

3. מסירת עותק ממערכי שיעור אותם הכינו המורים במהלך ההשתלמות.

במסגרת הריאיון יתבקשו המורים להזדהות, לצורך ביצוע ההצלבות הנדרשות בין הראיונות שייערכו במועדים שונים וכן, בין הראיונות לבין מערכי השיעור שיוגשו לעיוני.

תלמידי הכיתה שבה אתה/ה מלמד/ת יתבקשו לצורכי המחקר למלא בתחילת השנה ובסיומה שאלונים

הבודקים מודעות סביבתית, ידע סביבתי, עמדות בנושאים סביבתיים, רגישות סביבתית והתנהגות סביבתית וכן להשתתף בשיחה כיתתית בהנחייתי, בתחילת השנה ובסיומה, בנוגע לתפיסותיהם בתחום החינוך הסביבתי. איסוף המידע בקרב התלמידים יערך באופן שלא יאפשר את זיהוים.

ברצוני לציין מספר נקודות חשובות נוספות:

* המחקר הותר לביצוע על ידי לשכת המדען הראשי של משרד החינוך, בכפוף לתנאים שנקבעו במסמך ההיתר מטעמה המצורף בזאת לעיונך.
* כל המידע המזהה שייאסף על אודות המורים הנבדקים ישמש לצורכי המחקר הנדון בלבד.
* הנתונים המזהים על אודות המורים יישמרו בקובץ המוגן בסיסמה הידועה רק לי.
* אשמיט את כל הנתונים המזהים על אודות המורים שייאספו במסגרת המחקר מיד בתום עיבוד הממצאים או עד לתאריך 1.8.16, במועד המוקדם מבין השניים.
* פרסום ממצאי המחקר יבוצע באופן שלא יאפשר את זיהוי הנבדקים.

יודגש כי אין חובה להשתתף בהשתלמות ובאיסוף המידע על אודותיה.

אם את/ה מסכים/ה להשתתף בהשתלמות , למסור עותק ממערכי שיעור שתכין במהלכה ולהשתתף בראיונות שצוינו לעיל, תוך התחייבות מצדך לעמוד בדרישות תכנית הלימודים הקבועה בכיתה שבה תיישם את תכנית ההתערבות , אנא מלא/י את כתב ההסכמה המצורף למכתב זה והעבר/י אותו למזכירות בית-הספר בהקדם האפשרי.

אם הנך מעוניין/ת לקבל מידע נוסף על תכנית המחקר, ניתן ליצור עמי קשר בטלפון שמספרו 054-6266234 או בכתובת המייל raniaaz@walla.co.il .

בברכה,

ראניה שלש

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בברכה,
ראניה שלש

Questionnaire in English

A Questionnaire about the quality of environment for sixth Grade students

Dear Student :

This questionnaire is part of a research about the quality of environment. All the information in it will be kept confidential and will be used only for the research. It is forbidden to write your name anywhere on the questionnaire. This questionnaire is not a test and no scores will be given on it. Data from the Questionnaire will not be relayed to the teacher or any other party at the school.

Please answer the right according to your opinion.

Your answers are very important to me! Thank you for your cooperation.

Rania Shalash

Part (1)

1. Are you (circle): boy/girl

2. Year of birth: _____

3. Grade: _____

4. School name: _____

5. Address: _____

6. Religion: _____

7. Father's work: _____

8. Mother's work: _____

9. What is the average of your existence out of the house (not inside a building) in one day?

a. 0 hours   b. 1-2 hours   c. 3-4 hours   d. 5 and more hours

Circle the suitable number:

	To a very large extent	To a large extent	To a moderate extent	To a small extent	Not at all
10. To what extent you usually stroll with your family in nature (forest, Park, beach, lake…)	5	4	3	2	1
11. To what extent you are curious to know more about environment	5	4	3	2	1
12. To what extent you are aware of environmental problems	5	4	3	2	1
13. To what extent your family is aware of environmental problems	5	4	3	2	1
14. To what extent you care and act for the environment	5	4	3	2	1
15. To what extent your family cares and acts for the environment	5	4	3	2	1

Part (2)

Circle the correct answer:

16. What is the basic energy source for life on Earth's surface?

17. petroleum

18. sunlight

19. wind

20. plants

21. Ecology is the study of the relationship between:

22. different species of animals.

23. plants and the atmosphere.

24. organisms and their environments.

25. man and the environment.

26. Which of the following is limited energy source?

27. petroleum

28. wind

29. sea water

30. sunlight

31. Complete the sentence: most of the water in nature is:

32. Salt water

33. Groundwater

34. rivers and tables water

35. sweet water

36. What is the meaning of biodiversity (species diversity)?

37. the evolution process of different species

38. all the people that live on the planet

39. diversity of the different colors of animals and plants

40. the rich number of species and organs in nature

41. Which of the following materials decompose at the slowest pace?

42. newspapers paper

43. drinking metal can

44. Orange rind

45. Leaves

46. Which of the following materials cannot be recycled or used again?

47. paper

48. aluminum can

49. plastic bottle

50. disposable diapers

51. Complete the sentence: Scientists assume that the earth is heated as a result of:

52. Planting trees

53. Burning fuels

54. increased production of solar power

55. the approaching of the sun to the earth

56. "Ozone hole" is considered a serious environmental problem because it causes:

57. Escape of gases from the atmosphere into space.

58. Increase penetration of harmful solar radiation to earth.

59. Contraction of the Dead Sea.

60. Earthquakes, which cause great damage to man and nature.

61. Complete the sentence: Today, most of the garden trash and food leftovers are recycled to:

62. chemical fertilizer

63. compost (organic fertilizer)

64. paper books

65. fiber cloth

66. Where, nowadays, the home trash, that is not supposed to be recycled, is taken?

67. to the production of compost (organic fertilizer)

68. to reuse without a change of the product

69. to a controlled burning

70. to the dumps or landfills

71. The main problem with landfills is that they:

72. take up too much space

73. are ugly to look at and smell bad.

74. attract rats and others pests.

75. prevent farming of nearby land

76. Complete the sentence: the amount of open spaces in our country today ...

77. is growing because of the proliferation of greenhouses

78. is taking downward because of the increased population density

79. is growing due to the reduction of pollution sources

80. does not change over the years

81. Complete the sentence: The combustion of coal in power stations leads to an environmental problem because ...

82. the high stacks of the power plants pose danger to aircraft

83. the power stations occupies a lot of space for building

84. carbon dioxide and other gases are emitted to the air

85. a lot of electricity is used for coal combustion

86. Complete the sentence: Today, the use of water (high-quality) in our country for the largest ...

87. Agriculture

88. Houses and cities

89. Industry

90. Desert

91. Which of the following factors is considered nowadays the largest polluter of the air in our country?

92. gases released by transportation

93. smoke emitting from natural fires and human-caused fires

94. methane gas from animal secretions

95. cigarette smoke and dust released from agriculture

96. What happens to plastic bottles after they are placed in the recycling device?

97. they are smelted and turned into large blocks and then buried into the ground

98. they are cut into small pieces and various products are produced from it

99. they are packed again in the drinks factories after being washed and cleansed

100. they are burned in order to produce clean, cheap energy

101. Timber cutting in forests may lead to the:

102. rise in the percentage of oxygen in the air

103. decrease in the concentration of carbon dioxide

104. increase of earth warming

105. decrease of water vapor percentage in the air

106. What is the preference in using solar water heater that is placed on the roof of the house?

107. it saves electricity, because there is no need for pumps in order to flow water from the surface to inside the house

108. it saves electricity, because sunlight turns into heat that is used to heat water

109. it saves water, because it stores water used at home

110. it saves electricity, because the heat emanating from the surface is used to heat water

111. How are groceries taken home from the store in the most friendly way for the environment?

112. in a thin plastic bag.

113. in a thick plastic bag.

114. in a paper bag.

115. in a plastic basket or a shopping cart

116. which environmental field is related to the following symbol?

117. the water cycle in nature

118. recycling

119. actions for keeping the air clean

120. producing energy from the sun

121. Which vehicle is considered as the most harmful to the environment?

122. bicycle

123. bus.

124. private vehicles.

125. Train

126. A species that no longer exists is:

127. protected.

128. endangered.

129. abundant.

130. Extinct

131. Animals alive today are most likely to become extinct because:

132. natural selection kills weaker animals.

133. where they live is getting too warm.

134. they are unable to reproduce because of pollution.

135. the habitat where they live is destroyed.

136. What are invasive species?

137. Species suffer from the human invasion to their environment

138. Species of plants which animals are accustomed to mess with

139. species if spread in a new region cause damage to the environment

140. species proliferate in different ecological environments

141. What is the condition of wild animals in our land today?

142. they are in danger because there is an increase in demand for fur

143. they are in danger because of the construction that reduces the areas that suit them

144. they are better than ever because the quality of the environment improves

145. they are in danger because of the predatory animals

146. The society for the protection of nature is:

147. a governmental body that is responsible for forests and forestry in Israel.

148. an organization that specializes in producing fences and facilities for corners alive and zoos.

149. an organization that works for the promotion of nature conservation and education for the quality of environment.

150. an organization that specializes in herbal medicine and in the establishment of sanatoriums in nature

151. What is, in your opinion, the source of your information environment? (You can choose more than one answer)

152. school

153. family members

154. TV

155. books

156. computer / internet

157. other: _____

part (3)

To what extent do you agree among each of the following sentences? (tick × in the appropriate box):

	Strongly agree	agree	moderately agree	disagree	Strongly disagree
158. The subject "quality of the environment" should occupy a higher position in the hierarchy of school preferences	5	4	3	2	1
159. It is very important to me to preserve the environment	5	4	3	2	1
160. It is very important to preserve animals and plants only if they are useful to humans	5	4	3	2	1
161. I believe that I can contribute to the improvement of the environment through my personal behavioral	5	4	3	2	1
162. Every human being can affect the quality of environment	5	4	3	2	1
163. There is an exaggeration in the concern for the environmental problems	5	4	3	2	1
164. A person is allowed to use the nature in the way he wants	5	4	3	2	1
165. There is no effect of the increasing number of people on the quality of environment	5	4	3	2	1

166.	Human's acts cause a lot of damages to the environment	5	4	3	2	1
167.	People who cause damages to the environment should be punished	5	4	3	2	1
168.	A fine must be imposed on the factories that cause damage to the environment	5	4	3	2	1
169.	It is very important to have public parks and open spaces in residential areas	5	4	3	2	1
170.	I am worried about the impact of air and water pollution on the environment	5	4	3	2	1
171.	Electricity must be produced in ways less polluting even if it led to the lifting of its price	5	4	3	2	1
172.	I would be willing to save energy by using less air conditioning	5	4	3	2	1
173.	Although the use of oil pollutes the environment, there is no need to reduce its use in the country	5	4	3	2	1
174.	I would be willing to go walking instead of riding a car in order to minimize air pollution	5	4	3	2	1
175.	Water pollution is bad even if does not harm humans because it harms animals and plants	5	4	3	2	1
176.	I'm not worried about the lack of water in the country	5	4	3	2	1
177.	To save water, I would be willing to use less water when I bathe.	5	4	3	2	1
178.	To save water, I would be willing to turn off the water while I wash my hands or teeth	5	4	3	2	1
179.	The garbage that I produce, has a negative impact on the quality of environment	5	4	3	2	1
180.	I do not need to do anything regarding the dirt on the street	5	4	3	2	1
181.	I would be willing to separate family's trash for recycling.	5	4	3	2	1
182.	I would go from house to house asking people to recycle.	5	4	3	2	1
183.	If I recycle bottles, cans and batteries, this will improve the quality of environment	5	4	3	2	1
184.	I would be willing to write letters asking people to help reduce pollution	5	4	3	2	1
185.	If I had the opportunity, I would be willing to sign a petition in order to reduce pollution	5	4	3	2	1
186.	I would be willing to stop buying some products in order to minimize the damage to the environment	5	4	3	2	1
187.	I would give 20 shekels of my own money for the protection of animals and plants in nature	5	4	3	2	1

Part (4)

To what extent do you agree among each of the following sentences? (tick × in the appropriate box):

		Strongly agree	agree	moderately agree	disagree	Strongly disagree
188.	I love animals	5	4	3	2	1
189.	I love plants	5	4	3	2	1
190.	I love nature	5	4	3	2	1
191.	I hate nature	5	4	3	2	1
192.	I am frightened to think people don't care about the environment.	5	4	3	2	1
193.	It makes me angry to see damage in the environment	5	4	3	2	1
194.	It makes me happy when people recycle used bottles, cans, and paper.	5	4	3	2	1
195.	I get angry when I think about companies testing products on animals.	5	4	3	2	1
196.	It makes me happy to see people trying to save energy.	5	4	3	2	1
197.	I am not frightened about the effects of pollution on my family. ***	5	4	3	2	1
198.	I get upset when I think of the things people throw away that could be recycled.	5	4	3	2	1
199.	It makes me sad to see houses being built where animals used to live.	5	4	3	2	1
200.	It frightens me to think how much energy is wasted.	5	4	3	2	1
201.	It upsets me when I see people use too much water.	5	4	3	2	1

Part (5)

to what extent you do these actions? (tick × in the appropriate box):

	always	Most of the times	sometimes	rarel y	Never
202. I talk with friends and family about topics related to the quality of environment	5	4	3	2	1
203. I read information about environment from various sources	5	4	3	2	1
204. I watch a program in TV about nature and environment	5	4	3	2	1
205. My family and I go out in nature	5	4	3	2	1
206. I suggest to my parents to refrain from buying wrapped products in order to reduce the amount of waste we produce	5	4	3	2	1
207. I have asked my parents to recycle some of the things we use.	5	4	3	2	1
208. When I see people throwing dirt on the ground, I give them a note	5	4	3	2	1
209. When I see a paper or a piece of plastic on the ground, I pick it up and throw it in the garbage can	5	4	3	2	1
210. When I come across an environmental risk, I inform the municipality about it	5	4	3	2	1
211. I take a shower quickly in order to save water	5	4	3	2	1
212. I turn off the water in the sink while I brush my teeth to conserve water.	5	4	3	2	1
213. I let a water faucet run only when it is necessary.	5	4	3	2	1
214. I turn off the air conditioner and electric bulbs before I get out of the house	5	4	3	2	1
215. I leave the refrigerator open while I decide what to get out.	5	4	3	2	1
216. I use used papers for writing drafts	5	4	3	2	1
217. I take food to school in plastic box and not in nylon bag	5	4	3	2	1
218. I am keen to bring to school different products for recycling	5	4	3	2	1
219. I use rechargeable batteries instead of disposable batteries	5	4	3	2	1

Part (6)

This part was prepared to examine your ability to identify environmental problems and suggest solutions :

220. Read the following text and answer the questions below:

The widespread use of plastic products brings great benefit to humans, but it turns out that it can also cause great harm to the environment. After finishing using plastic products it is thrown in the waste container and ultimately up to the dumps. Plastic waste accumulate in the environment, occupy a significant space and disfigure the landscape because plastic, unlike paper and wood, which decompose relatively quickly, takes more time to decompose (about 400 years and more - if decomposed at all). Plastic is an example of a material that does not decompose (does not finish). We all produce plastic waste but we don't want plastic waste, therefore we have a problem!

221. What is the environmental problem mentioned in this text?

_____
_____

222. Suggest a solution to the problem, and explain how this solution can reduce this problem? (you may suggest more than one solution).

_____
_____

223. Specify another environmental problem that exists in the country or in your area. Specify the location, the cause and a possible solution to the problem.

Example: **The problem**: water pollution

Location: groundwater, streams

Cause: factories

Possible solution: sewage treatment

224. **Problem**: _____

225. **Location**: _____

226. **Cause**: _____

227. **Possible solution**: _____

Thank you very much for your cooperation

Questions for personal interview with teachers Appendix (5)

(Semi-structured interview, before performing the intervention program)

228. What does it mean to you the concept "environment"?

229. What does it mean to you the concept "natural environment"?

230. What does it mean to you the concept "artificial environment"?

231. What does it mean to you the concept "quality of environmental"?

232. What does it mean to you the concept "environmental sciences"?

233. What do you think about the level of your knowledge concerning environmental issues"?

234. What do you think about the level of your awareness concerning environmental problems"?

235. What do you think about the level of your activism concerning the environment"?

236. Do you think the "Green School"/the environmental programs help to improve the environment in the school? How?

237. Do you think the "Green School"/environmental program helps to improve the environment in the students' neighborhood? How?

238. What are the goals of the "green school" program/ environmental programs in your opinion?

239.　What are your expectations from these program?

240.　What do you think about the students' level of awareness regarding the environment and the environmental problems?

241.　What do you think about the teachers' level of awareness regarding the environment and the environmental problems?

242.　Do you think that the teachers do something for the environment?

243.　Do you think that the students do something for the environment?

244.　What do you do in your school for the environment?

245.　What do you think of the environmental problems that exist in the school and the students' neighborhood?

246.　Who is responsible for these problems? Why?

247.　Who takes care of these problems do you think?

248.　Do you know any green associations or organizations that take care of the environment? What do they do?

249.　Do you have any questions about the "green school" program/ the environmental programs?

250.　Suggest ways to improve the "green school program"/ the environmental programs?

Extra questions, for an interview with teachers after transferring the intervention program:

251.　What was the main goal of the intervention program?

252.　Do you think the goals of the program were achieved?

253.　Name a goal that was achieved during the program.

254.　Name of a goal that was not achieved or was partially achieved and what do you think should be done in order to achieve this goal?

255.　List three things you learned in the program.

256.　List one thing that the students learned indirectly as a result of the program.

257.　What did the program renew for the students and how did it affect them?

258.　Do you think this program will improve the quality of the school environment? How?

259.　Do you think this program will improve the environment in the students' neighborhood? How?

260.　Do you have any new suggestions that can help raising the EL level among students?

Questions for focus groups (group interviews) - sixth grade students

Semi-structured interview

261. What does it mean to you the concept "environment"?

262. What does it mean to you the concept "natural environment"?

263. What does it mean to you the concept "artificial environment"?

264. What does it mean to you the concept " quality of environmental"?

265. What does it mean to you the concept "environmental sciences"?

266. To what extent you think you are aware of the existing environmental problems?

267. To what extent do you think that members of your family are aware of the existing environmental problems?

268. To what extent do you act for the sake of the environment?

269. To what extent do you think that your family members act for the sake of the environment?

270. What do you think about the level of your environmental knowledge?

271. What is the source of your environmental knowledge?

272. Do your teachers refer to environmental issues during the classes?

273. In which classes they referred to environmental issues?

274. How do you feel about the environment? do you like nature, animals and plants?

275. What are the goals of the environmental programs/ the "Green School" program according to your opinion?

276. What are your expectations from the environmental programs/the green school project?

277. Do you think that the environmental programs/the green school program will improve the quality of the environment in the school? How?

278. Do you think the environmental programs/the green school program will improve the quality of environment in your neighborhood? How?

279. What do you think about the environmental problems in your school and in your neighborhood?

280. Who is responsible for these problems? why?

281. Who deals with these problems?

282. What is the level of your teachers' environmental awareness according to your opinion?

283. Do you think that the teachers do something for the environment?

284. What do you do in your school for the environment?

285. Do you have any questions about the environmental programs/the green school program?

286. Suggest ways to improve the environmental problems/the green school program?

Appendix (7)

Details of the intervention program

Content of sessions:

First Meeting topic: matching expectations, creating a contract and familiarity with basic concepts in environmental issues. Type of meeting: Workshop. Teaching methods: independent work, group work, presenting information using a projector, and a plenary discussion and teaching with a presentation. The purpose of matching expectations is to identify and express publicly the realistic expectations about the program, to coordinate and discuss the expectations of the participants and to provide a basis for decision-making and joint planning of activities. And the purpose of the contract is to define the rules of the expected behaviors of the group. During the meeting, the moderator began with a statement about the purpose and importance of EE and immediately presented the following questions: What are the important issues that we should deal with during the meetings? What do you need? What are your expectations of yourselves, of the moderator, of the group (teachers participating) and of the program? The moderator asked all teachers to write their expectations on paper, then each teacher was asked to read what he wrote in front of everyone (except the expectation of himself). Later the teachers were asked to discuss them and decide about their most important expectations from the moderator, the staff and the program itself. The moderator wrote the expectations, that all teachers decided on and agreed upon them, on the board, then the moderator introduced the following questions: How can we work to achieve these expectations? What are the rules of conduct that may help in fulfilling these expectations? The teachers were asked to make suggestions. The moderator recorded all suggestions on the board and a discussion was conducted (The moderator cared to direct the teachers to address these points: number of meetings, the

obligation to a complete attending, dates of meetings, place of meetings, keeping the meeting schedule, announcements in advance for absences, rules of conduct and speech, sharing the team with success and / or difficulties, presenting lessons etc ...). At the end of the discussion, rules were selected with the consent of the majority and were recorded on a large paper and hanged on the wall and it was a kind of work contract whose purpose was to clarify and define the rules of conduct in the group. In the second part of the meeting: The moderator has defined the concept "environment" and referred to the concept of "environmental justice". Examples from daily life were used. At the end of the meeting, the moderator turned her teachers, who are interested in enrichment on the subject, to read the article "Environmental Justice in Israel: the encounter between human rights laws and environment laws" for Daniel Fish.

Second meeting topic: the environment as a source of knowledge and as a source for personal development and the impact of the natural environment on the person. Type of meeting: Lecture and workshop. Teaching methods: frontal teaching with presentation, group work, plenary discussion, presentation a drawing or model or another. In the first part of the meeting a lecture was transferred. Lecture topics: What is a learning environment? The role and importance of the learning environment, the learning environment as a source of knowledge and as a developer of the personality, and the school yard as a learning environment, presenting the research of Dr. Naomi Wax, the nature and the natural environment as a learning environment and the importance of fostering the connection to the natural world and the environment. In the second part of the meeting a workshop was held, it aimed to indicate the ecological services that a person receives from the natural environment and to describe the perfect environment in which we want to live. The moderator made it clear from the beginning that the workshop can serve as a teaching model and each teacher can try it with his students (better during the education hours). In the first part of the workshop the moderator asked: What are the ecological services that we receive from the environment? a discussion took place and at the end of the debate the moderator recorded the answers on the board. Further, the moderator asked: Why should we protect the environment? because of the gifts it gives us, or because its value? teachers responded, and a discussion was held and at the end the moderator explained the concepts "anthropocentric approach" and "Ecocentrism approach". Further, the moderator asked the teachers to split into groups and asked each group to describe the perfect environment in which they strive to live (in light of the conversation and the debate) in the form they want (drawing, model, written section...), and the title was "the perfect environment for us." At the end, the moderator hanged the paintings (or else ...) on the board and they were used in In subsequent meetings.

Third meeting topic: the environmental crisis (human impact on the environment). Type of meeting: film and lecture. Method of instruction: Watching parts of a film and frontal teaching with presentation. In the first part of the meeting the teachers watched parts of the film called "Our Home". After watching the film the moderator asked: What did you see in the movie? What do you think about what you have seen in the movie? What is the problem presented? What can you do? a discussion took place between teachers. In the second part of the meeting a lecture was transferred. The issues raised in the lecture were: the environmental crisis and its causes, the ways we must take to deal with this crisis, the importance of the younger generation in this tackling. At the end of the meeting, the moderator asked the teachers to read about "teaching in an outdoor learning environment" and to bring with them their action plan as a preparation for the next meeting.

Fourth meeting topic: active learning, learning outside the school and learning trip. Type of meeting: lecture, workshop and peer learning. Teaching methods: frontal teaching with presentation, group work, presentation of a lesson plan. During this meeting the teachers received skills and tools to relate intelligently to environment as a resource that helped them to plan a lesson array in order to give it in an outdoor environment. In the first part of the meeting a lecture was transferred. The issues raised in the lecture were: definition of the concept "active learning" and active learning objectives, definition of the concept "the outdoor environment" and the unique targets of outdoor teaching, the learning trip as a model for teaching and the importance of the preparatory classes before performing the outdoor activities. In the second part of the meeting a workshop was conducted. The participants were divided into groups according to their teaching profession and each group mapped the curriculum. During the mapping, teachers checked whether their curriculum includes concepts that might be illustrated in the field; if there is information available outside of the classroom regarding subjects they teach; if their curriculum includes skills that might be practiced in the field (natural and urban); if there was a mention in the curriculum for special places that can be visited. Then each group defined a theme and objectives for an outdoor lesson which in their opinion it is possible to develop and integrate in their work during the remainder of the school year. Further, teachers watched slides that were taken in the immediate area of the school, including a variety of natural and human phenomena. Teachers were impressed by the abundance of the issues in the nearby school. Teachers discussed the options of teaching into the sites that were presented, and the considerations in selecting an outdoor learning station were analyzed . Further, each group was asked to find a possible learning station in the school environment, that appropriate the purpose of the lesson they developed before.

For conclusion, the moderator introduced the lessons plans prepared by teachers to all the teachers and asked them to present the them to the students.

Fifth meeting topic: EE in our country and abroad, and EL (historical background). Type of meeting: Lecture. Teaching methods: frontal teaching with the use of a presentation. During the meeting the moderator gave a lecture with the use of a presentation on these issues: EE as a response to the global environmental crisis: definitions, development and goals; EE in our country: with what did previous teachers deal and with what are teachers dealing today; defining key concepts in EE and focusing on the concept of "environmental literacy": knowledge, attitudes, behavior and decision-making in the environmental-education context. At the end of the meeting, the moderator asked a question to think about for the next meeting: how do you personally perceive the concept "environment"?

Sixth meeting topic: approaches in EE. Type of meeting: Workshop and lecture. Method of teaching: individual work, frontal teaching with the use of a presentation. In the first part of the meeting each teacher was asked to write on a paper how he perceives the concept of "environment" as an answer to the question given last meeting. Further, the moderator asked each teacher to read what he wrote and meanwhile the answers were summarized and recorded on the board. In summary, the moderator explained the importance of clarifying the environmental perceptions of those involved: environmental perceptions of people affect their environmental behavior so because the main goal of the EE is to lead a responsible environmental behavior it must be based on people's different perceptions so it is important to understand and decipher them. Analysis of the environmental concepts can also contribute to the development of effective and significant programs and methods of teaching in EE, that extend and deepen these understandings. In the second part of the meeting the moderator gave a lecture with the use of a presentation that focuses on these issues: different approaches to EE, the old and the new: concepts and objectives, assumptions, sources and review for each approach (in short); and the sustainability / sustainable development approach and EFS as a social, political and environmental approach.

Seventh meeting topic: the waste problem and the water problem. Type of meeting: Lecture. Teaching methods: frontal teaching with the use of a presentation (presenting images from around the world, from our country and the from nearest region in order to illustrate the problem). The issues raised at the meeting: the garbage problem around the world and in our country; sources of garbage, saving processes, reusing, incineration, recycling, waste handling; the water problem in the world and

in the country; and sources of the problem, recognition with concepts - the water level of Kineret, aquifer, water allocation, water pollution.

Eighth meeting topic: the problem of waste incineration in the Arab sector. Type of meeting: Lecture. Teaching method: watching a movie, plenary discussion, frontal teaching with the use of a presentation. At the beginning of the workshop, teachers were asked to watch a short film entitled "Prevention of waste incineration in the Arab sector." After watching the film the moderator asks: What is the problem presented in the film? does this problem exist in your neighborhood? What do you think has caused to this problem? Is it possible to solve the problem? How? Is the movie good enough? Can it help solving the problem? What else could help? a discussion was held about the presented problem. Further, the moderator presented a presentation in the topics: the source of waste incineration problem in the Arab sector, struggling against the phenomenon, cooperation as a solution to the problem. A discussion took place between teachers and the important points were summarized on the board. At the end of the meeting the moderator directed the teachers, in preparation for the next meeting, to review the brochure: "EFS-to weave life together-an outline for planning a school curriculum in the EFS, in the state and the religious-state school in grades one to six, 2012" and also to read about the program "green school".

Ninth meeting topic: activating the EE in the school curriculum and the EE projects operated by outside agencies. Type of meeting: Lecture. Teaching methods: frontal teaching with the use of a presentation and plenary discussion. The main points that were raised at the meeting: necessary conditions for activating EE at school; models for activating EE at school: each environmental program includes a plan and ways of action and each program is activated in various ways by: Leading teachers, learning teachers' room, professional teachers in the field of environment, professional environmental organizations and leading students. The moderator referred to each model briefly, and concentrated on the model "learning teachers' room" and on its advantages and disadvantages; types and scopes of EE programs; the environmental document of the NAAEE (North American Association For EE) that can be used as an aid for planning curriculum in EE; the preparatory process for running an EE program (presenting the stages through a chart and explaining each stage); definition of the concept environmental action or environmental activism and explaining the importance of environmental activity and the way in which the environmental activity is combined at school through ongoing or limited programs with different shades (scientific, social, economic, political ...); a review of ongoing programs and projects focusing on EE and operated by external bodies; focusing on "the qualification process for green school" and referring briefly to the

other programs: the Green Network, the bead model of the Jewish National Fund, the Green Student Council, the "a beauty of Israel", the "trail around Sea of Galilee"; limited review of the organizations that deal with EE and their activities: Ministry for the Environment, the Society for the Protection of nature, the Nature and Parks authority NPA, the Green Network, the Jewish National Fund and the teaching center of the Council for a Beautiful Israel; discussion regarding the existing environmental program at the school and comparison with what was learned in order to map the current situation in the school.

Tenth meeting topic: evaluation in EE. Type of meeting: Lecture. Teaching methods: frontal teaching with the use of a presentation and individual work. The main points raised at the meeting: assessment for learning as a tool for improvement and not for reporting; evaluation of programs and projects; assessment of learners (students) or outputs of the program; assessment through a case study - showing examples; showing examples of evaluation tools that were used recently in the country in primary schools; and transferring a questionnaire that assesses the level of EL of teacher in order to experience the evaluation tools. (the questionnaire was developed by the researchers Goldman, Yavets and Pe'er in 2008, in order to determine the level of EL of students at the end of their third year in the colleges of education).

Eleventh meeting topic: a tour/visit in a green school, leading in EE, in the North. Type of meeting: tour. Method of teaching: tour, presentations, watching a video and discussion. The purpose of the visit: to learn about how theoretical studies, which are related to environmental issues, are held in school; which topics and concepts are included in the program of the school; which teaching methods about environment they use; to recognize the action plan in which the school is implementing a sustainable lifestyle; to learn about the methods that the school uses for a green visibility; and to learn about the environmental projects at school (what activities students perform in order to bring about a change in consciousness and in behavior of the community in relation to the environment) and about the form in which the green leadership act at school.

Twelfth and thirteenth meeting topic: Presenting Lessons/integrating the environmental theme in different teaching professions. Type of meeting: peer learning. Teaching method: using presentation and discussion. Towards these meetings, teachers were asked to work in groups according to their specialization (science, geography, homeland, Arabic language, Hebrew language, English language and mathematics), to plan and teach a lesson (in or outside the classroom) in a topic related to the environment for a certain layer (of their choice) in view of the material taught in the lectures, in the workshops and in the discussions that took place in meetings with focusing on

environmental knowledge, attitudes and behavior that we strive to promote and raise among students. During these two meetings each group chose a representative who presented the lesson to the others. Teachers shared each other with the successes and/or difficulties that they experienced and they talked about their experience and the contribution of the meetings to their private development. At the end of the meeting each teacher was asked to summarize, in one phrase, what he learned from this program, how the program has contributed to his professionalism and how he plans to continue to apply what he learned while working at the school, as a summary of the intervention program.

Fourteenth and final meeting topic: a concluding tour at the center for research and EE in Sakhnin. Type of meeting: tour. Teaching methods: frontal teaching, watching a movie and visiting the stations of the center. The purpose of the visit: to give teachers the opportunity to have a practical authentic experience in areas of knowledge such as sewage treatment and improvement of reclaimed water, energy conservation, alternative energy and green building. The intervention program was divided into two phases: introduction to the environment and deepening and application in specific issues.

STATEMENT ON ACCOUNTABILITY

The undersigned, declare on my own responsibility that the materials presented in the present doctoral thesis are the result of my own researches and scientific achievements. I am aware of the fact that, otherwise, I will bear the consequences in accordance with the law in force.

Shalash Rania

Signature

Date

Curriculum Vitae

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Education

2012-2016   - Ph.D. student at the Faculty of Psychology and Educational Science, Department of Educational Science, specialty- 13.00.01- General Pedagogics. Moldova State University- Chisinau.

1999-2016   - Variety of training courses and advanced studies for the development of my personal training in my work framework as teacher and coordinator of the subject of science and technology.

1997-1999   - M.Ed degree in Educational Management, Department of Derby University in Israel.

1987-1989-   - A teaching certificate for secondary schools in Natural Sciences speciality, Hebrew University, Jerusalem.

1985-1988-   - B.Sc degree in Biology (Natural Sciences), Hebrew University, Jerusalem

1983-1985   - High school certificate, from "St. Joseph Nuns' " School with speciality in biology, English and Mathematics.

Professional Activities (Education and Teaching):

1994 - present   - Teacher and coordinator of the science and technology profession in primary school of Alsharek, Nazareth.

1996 - 2002	- Teacher of Biology in Naamat Technological High School (an Israeli women's organization affiliated with the Labour Zionist Movement), Nazareth.
1994 - 1997	Lecturer in the joint college of education in Sakhneen, Israel, and coordinator of the courses: correct nutrition and hygiene and health.
1991 - 1994	- Teacher of Biology in Junior High School "A", Nazareth (a teacher of Natural Sciences in grades 7-9 and layer coordinator).
1991 - 1997	- A registrar and secretary in the British Council (a cultural and pedagogical Center that trains teachers to teach English in primary schools), Nazareth.
1990 - 1991	- Teacher of Biology in Terra Santa High School, Nazareth (a teacher of Natural Sciences in grades 7-10 and science laboratory director). .
1989 - 1991	- Lab assistant in the department of microbiology in Hadassah Hospital Ein Karem, Jerusalem.

Areas of Scientific Interest: Natural sciences; Biology; Ecology; Technology; scientific and technological education; scientific research; Environmental Education; education for Environmental Literacy; integrating arts in education and teaching; and motivation to teach in institutions of higher and colleges; guidance and training groups of teachers in environmental education.

Articles Published in Scientific Journals:

287. **Shalash Rania.** Environmental Education in Israel. In: Studia universitatis, series: educational sciences, CEP USM, 2014, nr. 5 (75) , p. 158-166. ISSN 1857-2103

288. **Shalash Rania.** Different Approaches in Environmental Education. In: Studia Universitatis, Seria: Educational Sciences, CEP USM, nr. 9 (79), 2014, p. 205-207.

289. **Shalash Rania**. Evaluating Environmental Education Programs. In: Didactica pro, magazine of educational theory and practice, Chişinău, Dec, Oct 2013, p. 29-33.

290. **Shalash Rania.** The Arab Society and the Environment. In: Studia universitatis, series: educational sciences, CEP USM, 2014, nr. 9(79), p. 205-207. ISSN 2345-1025

291. **Shalash Rania**. Empowering Teachers: an intervention program for raising the awareness, changing perceptions and implementing environmental contents in the educational system. In: Didactica pro, magazine of educational theory and practice, Chişinău, Sep 2015, p. 16-21.

292. **Shalash Rania**. Evaluating EE Programs through the Assessment of Students' EL. In: The Official Site of Carmel College-Israel, August 2015. (Accessed in 20.1.2016)
http://mcd.org.il/site/wp-content/uploads/2016/02/Evaluation-of-EE-Programs-through-the-Assessment-of-Students-EL-AUGUST-2015.pdf

Participation and Presentation in International Scientific Conferences

293. **Shalash Rania.** Environmental Education Programs in primary Schools of the Arab Sector: Evaluating "green school" program, outlooks of teachers and environmental literacy of students. the International Scientific Conference: Postmodern Education between efficiency and functionality, Moldova State University, faculty of psychology and educational sciences, center of research in educational, social and humanitarian sciences, Chişinău, Nov 2013, p. 375-378.

294. **Shalash R.** Old and Young Approaches in Environmental Education. The International Scientific Conference: Higher Education: meaning and educational opportunities for research and innovation transfer ", Chisinau, 2016; 28-29 Sep 2016, 8p.

295. **Shalash R.** The Arab Society and the Environment. The International Scientific Conference: University Education and labor market: connections and percpectives, Chişinău, Nov 2014, p.184-188, ISBN 978-9975-71-675-8

Rewards:

2011 An Outstanding Teacher Award on behalf of The Foundation for Encouraging Educational Initiatives for an educational initiative in Al-Sharq primary school in Nazareth.

Knowledge of Languages: Arabic (mother tongue); Hebrew (excellent knowledge in spoken and written Hebrew); English (excellent working knowledge); French (good knowledge in spoken and written French).

Personal skills and competences
Computer experience – very good proficiency in MS OFFICE + MS WINDOWS