CHEMISTRY SUBJECT INFLUENCING ON STUDENTS' ENVIRONMENTAL KNOWLEDGE AND AWARENESS IN TIRANA DISTRICT LOWER SECONDARY SCHOOLS

Nihat Aksu

Dorëzuar
Universitetit Europian të Tiranës
Shkollës Doktorale

Në përmbushje të detyrimeve të programit të Doktoratës në Shkenca Sociale, me profil Psikologji-Pedagogji, për marrjen e gradës shkencore "Doktor"

Udhëheqës shkencor: Prof. Dr. Vilma TAFANI

Numri i fjalëve: 60677

Tiranë, janar 2016

PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all materials and results that are not original to this work.

ABSTRAKTI

Studimi ka si qëllim të vlerësojë ndikimin e lëndës së kimisë në njohuritë mjedisore dhe ndërgjegjësimin e nxënësve të klasave të 8-ta dhe të 9-ta. Për të vërtetuar hipotezën janë shtruar katër pyetje nën-kërkimore, duke marrë parasysh efektet e katër aktorëve: kurrikula, njohuritë mjedisore të mësuesve të kimisë, materialet mësimore dhe përdorimi i mundësive mjedisore. Ky studim është bazuar në teoritë e të mësuarit si biheviorizmi, konstruktivizmi; teoritë e sjelljes pro-mjedisore si vlerë-besim-normë, sjellje e planifikuar; dhe në pedagogjinë e të mësuarit aktiv.

Kampioni i studimit është përzgjedhur nga 21 minibashki të qarkut Tiranë. Kampioni i sondazhit përbëhet nga 963 nxënës të klasës së tetë në 28 shkolla 9-vjeçare publike, 1621 nxënës të klasës së nëntë dhe 41 mësues të kimisë nga 39 shkolla 9-vjeçare publike. Në këtë tezë, analiza e përmbajtjes dhe metoda e sondazhit janë përdorur si metoda të mbledhjes dhe të interpretimit të të dhënave. 28 tekstet mësimore dhe 7 kurrikula për klasat 8-ta dhe të 9-ta janë analizuar, shqyrtuar dhe krahasuar për të përcaktuar nëse ato përmbanin tema të caktuara mjedisore. Janë hartuar Pyetësorë për Njohuritë Mjedisore dhe Ndërgjegjësimin e Nxënësve dhe Pyetësorë për Mësuesit mbi Aftësitë e Mësimdhënies dhe Njohuritë Mjedisore të tyre, të cilët janë përdorur gjithashtu si metoda të mbledhjes së të dhënave. Për të analizuar të dhënat sasiore, janë realizuar statistika përshkruese dhe regresi logjistik binar. Përgjigjet e pyetjeve të hapura u janë nënshtruar analizave të përmbajtjes sasiore dhe cilësore.

Niveli i njohurive mbi përmbajtjen i mësuesve të kimisë, kurrikula, përdorimi i materialeve mësimore dhe përdorimi i mundësive të mjedisit rezultoi që të kenë ndikim të rëndësishëm në njohuritë mjedisore dhe ndërgjegjësimin e nxënësve të klasave të 8-ta dhe të 9-ta. Studimi, gjithashtu konstatoi se faktorët e mëposhtëm ndikojnë në njohuritë mjedisore dhe ndërgjegjësimin e nxënësve të klasave të 8-ta dhe të 9-ta: përdorimi vetëm i metodës me në qendër mësuesin, mangësia në të mësuarin e të gjithë dimensioneve (shkak, pasojë, kurim) të problemeve mjedisore, mungesa e një kurrikule efektive të lëndës së kimisë, mungesa e materialeve mësimore dhe përdorimi jo i mjaftueshem i mundësive të mjedisit. Teza përfundon me rekomandime se si mund të rriten niveli i njohurive mjedisore dhe ndërgjegjësimit të nxënësve dhe mësuesve.

Fjalët kyçe: *edukimi mjedisor, njohuri mjedisore, ndërgjegjësimi mjedisor, mësimdhënia e kimisë, kurrikula, arsimimi në mjedis të hapur, strategji mësimore.*

ABSTRACT

The purpose of the study is to evaluate the influence of chemistry as a subject on grades 8 and 9 students' environmental knowledge and awareness levels. To prove the hypothesis; chemistry lessons have significant influence on students' environmental knowledge and awareness; 4 sub-research questions are undertaken by considering the effects of four predictors: curriculum, environmental content knowledge of chemistry teachers, instructional materials and use of environmental opportunities. This study is based on learning theories as behaviorism, constructivism; pro-environmental behavior theories as value-belief-norm, planned behavior; and active learning pedagogies.

The sample of study was selected from 21 mini-municipalities of Tirana Country. The sample of the survey consisted of 963 8th graders from 28 public lower secondary schools, 1621 9th graders and 41 chemistry teachers from 39 public lower secondary schools. In this thesis, content analysis and survey data collection methods were used. The 28 textbooks and 7 curricula for grades 8 and 9 were analyzed, explored and compared to determine whether they contained certain environmental topics and objectives. Students' Environmental Knowledge and Awareness Questionnaire and Teachers' Environmental Knowledge and Instructional Skills Questionnaire were designed and used as data collection instruments. To analyze the quantitative data, descriptive statistics and binary logistic regression were conducted. The responses to open-ended questions were subjected to quantitative and qualitative content analysis.

The content knowledge level of chemistry teachers, the curriculum, use of instructional materials and use of environmental opportunities resulted to have significant effects on 8th and 9th grade students' environmental knowledge and awareness. The following factors were also found to influence the environmental knowledge and awareness of grades 8 and 9 students: sole use of only teacher-centered approach while teaching, lack of teaching all dimensions (cause, consequence, and cure) of environmental issues, lack of an effective chemistry curriculum, lack of instructional materials, and inadequate use of environmental opportunities. The thesis concludes with recommendations on how to increase the environmental knowledge and awareness levels of students and teachers. Further research is also recommended.

Keywords: *environmental education, environmental knowledge, environmental awareness, chemistry education, curriculum, outdoor education, instructional materials*

DEDICATION

to my dear wife

ACKNOWLEDGEMENTS

This thesis could not be finished without the help of many people. First of all, I want to express my deepest gratitude to my supervisor Prof. Dr. Vilma Tafani for her limitless support, guidance, patience, encouragement, and trust. This thesis would have not been finished without her support. I wish to extent my gratitude and appreciation to members of my doctoral day commission: Assoc. Prof. Dr. Edi Puka, Prof. Dr. Erlehta Mato, Assoc. Prof. Dr. Nikoleta Mita, Assoc. Prof. Dr. Ylljet Alicka, and Assoc. Prof. Dr. Tomi Treska. Their expertise and guidance were invaluable during these doctoral day presentations. I would like to give my deepest thanks to my friends Mr. Fatih Ufuk Bağcı, Mr. Adil Kutlu, and Dr. Lokman Coşkun for their moral support and help. Also, I wish to indicate my appreciation to Mrs. Elizabeth Wambui Nganga for her revision of my thesis and her continuous feedback. I would like to indicate my gratitude to the validity panel members (Mr. Bekim Trezhnjeva, Mr. Genci Kadilli, Mrs. Blerina Bajrami, Mr. Olsi Nika, Mrs. Ina Nasto, Mrs. Marinela Mitno, Mr. Olsion Lama, Mrs. Eva Dulellari, Mr. Mihallaq Qirjo, Mr. Ylli Muçogllava, and Mrs. Myrvete Kali) who kindly accepted my invitation to be part of expert panel to review the data collection instruments and questionnaire items evaluators (Mr. Afrim Sezai, Mr. Ibrahim Nako, and Mr. Esat Bunguri) who kindly accepted to evaluate the instruments' items. I wish to give special thanks to Mrs. Zamira Gjini, Director of Pre-University Department, Ministry of Education and Sports, Mrs. Englantina Metani, Tirana County Education Director, and Mr. Xhevahir Hoxha, Head of the Information Technology and Statistics of Tirana Country Educational Department for supporting my research and approving my data collection instruments. I would like to indicate my gratitude to Mrs. Rezana Vrapi, General Director National Agency of Examinations who reviewed the data collection instruments and approved. I also would like to thank to the school principals and the teachers who voluntarily cooperated with me, and thank to the students and chemistry teachers who seriously take the study and completed questionnaire. My special thanks go to my wife, Arzu, for her love, endless encouragement, support, patience and her unshakable faith in me.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVATIONS

AKP	National Examination Agency
C8EKAQ	Class 8 Environmental Knowledge and Awareness Questionnaire
C9EKAQ	Class 9 Environmental Knowledge and Awareness Questionnaire
CEC	Commission on Education and Communication
EE	Environmental Education
EE&T	Environmental Education and Training
EEA	Environmental Education Act
EIA	Environment Impact Assessment
EL	Environmental Literacy
ELC	Environmental Literacy Council
ELQ	Environmental Literacy Questionnaire
EPA	Environmental Protection Agency
EPI	Environmental Performance Index
ERB	Environmentally Responsible Behavior
ESD	Education for Sustainable development
EU	European Union
GDP	Gross Domestic Product
HDI	The Human Development Index
IEEP	International Environmental Education Programme
IUCN	The International Union for the Conversation of Nature and Natural Resources
IZHA	Educational Development Institute
MDGs	Millennium Development Goals
MEA	Multilateral Environmental Agreement
MoEFWA	Ministry of Environment, Forests and Water Administration
MoES	Ministry of Education and Science
MoLSAEA	Ministry of Labor, Social Affairs and Equal Opportunities
NAAEE	The North American Association for Environmental Education
NEEAC	The National Environmental Education Advisory Council
NGO	Non-governmental Organization
NSDI	National Strategy for development and Integration
OECD	Organisation for Economic Co-operation and Development
PCK	Pedagogical Content Knowledge
REAs	Regional Environmental Agencies
REB	Responsible Environmental Behavior
REC	The Regional Environmetnal Center
SMK	Subject Matter Knowledge
TACSO	The Technical Assistance for Civil Society Organizations
TEKAISQ	Teachers’ Environmental Knowledge and Instructional Skills Questionnaire
TPB	Theory of Planned Behavior
U.S.	United States
UN	United Nations
UNDESD	The United Nations Decade of Education for Sustainable Development
UNDP	United Nations Development Programme

UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	The United Nations Environmental Programme
UNEP	United Nations Environment Programme
UNEPMS	United Nations Environmental Education Curriculum for the Middle School
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNICEF	The United Nations Children's Fund
WEHAB	Water, Health, Agriculture, and Biodiversity and Ecosystem Management
WSSD	The World Summit for Sustainable Development
WWF	World Wildlife Fund for Nature

CHAPTER I: INTRODUCTION

1.1 Background of the Study

A complex blend of factors, principally related to human lifestyles, have resulted in the myriad of environmental problems that we are facing today. These factors include, but are not limited to, uncontrolled use of natural resources, rapid population growth leading to increased demand for food, deforestation, extinction of biological resources and poverty. Economic growth and industrialization have also either given rise to or further enhanced these problems The cause and effect of these problems is experienced throughout the world in varied proportions as people battle with inadequate water resources, air and water pollution, acid rains, soil pollution and erosion, ozone layer depletion, and global warming.

Over the years, as environmental problems increased, the need to take action to counter them and protect the environment became apparent. The initial view, which was held for years, was that environmental protection could be achieved through scientific and technological efforts. This was however established to be inadequate. Given that human lifestyles are major contributors to environmental degradation, there was need to help people understand the impact of their decisions and actions on the environment and call for a change of attitudes and practices. This prompted the birth of environmental education to equip people with knowledge, skills, and values and to inspire positive attitudes towards the environment.

Today, environmental education is recognized as a major force in the fight against environmental degradation and in the quest for a sustainable future. By training people to become aware of environmental issues and to take prompt action, it plays a crucial role in the preservation of the environment (DİNÇER, 2012). Over time, it has been modified as environmental problems and their effects increase. Various intergovernmental forums and documents from the 1970s have highlighted the significance of environmental education in addressing these problems. These forums and documents include the UN Conference on Human Environment in Stockholm (Declaration, 1972), The Belgrade Charter (UNESCO, 1975), The Tbilisi Declaration (T. UNESCO, 1978), The Brundtland Report (Brundtland, 1987), The Rio Earth Summit (E. Summit, 1992) and the Johannesburg Summit (UN-Johannesburg, 2002).

UNEP & UNESCO (1987) stated that people are a product of the environment they belong in and as such, change or destruction of this environment by any means affects the living conditions of the living organisms in it. This gives credence to the importance of environmental education in sensitizing individuals on environmental issues and all matters pertaining to this subject in an endeavor to create a healthier and more reliable environment (ŞAHİN, Cerrah, Arzu, & Şahin, 2004).

In the delivery of the aims of environmental education which include transformation of behaviors and attitudes to favor sensitivity to and protection of the environment, schools bear the heavier burden (Şimşekli, 2001). The assumption that children have knowledge about the environment should not be held. Instead of this, environmental education should focus on helping children understand the environment (Loughland, Reid, Walker, & Petocz, 2003).

A study conducted by Hines, Hungerford, and Tomera (1987) lay emphasis on the need for people's awareness of environmental issues. This could be achieved through environmental education in which the main goal would be the development of an environmentally literate society. A society equipped with knowledge on environmental issues will possess the right values, attitude and concern that can translate into appropriate action geared towards better environmental conditions. With this in mind, Hines et al. (1987) were of the opinion that environmental education should show the relevance of environmental issues, especially global ones, to a learner's life in order to elicit the desired response towards solving the issue(s). A major hindrance to the ideal of a citizenry that is environmentally responsible is lack of knowledge of all the factors essential to the development of environmentally responsible behaviors.

To effectively protect and restore the environment, environmental awareness, knowledge, and commitment are a prerequisite. The society must be enlightened on the problems affecting the environment. This means that those charged with environmental education must have a wide scope of knowledge and understanding on environmental problems and how to remedy them. In addition, they must be action oriented (Madsen, 1996).

When environmental education is taught from an early stage in life, learners progressively develop knowledge, skills, positive attitudes and concern vital to the conservation of the environment. This in turn culminates in an environmentally responsible citizenry.

Environmental education is vital to environmental conservation. However, according to environmental scholars like Fien (1993), Daniella Tilbury (1995),and J. A. Palmer (1998), for its essence to be acknowledged by the society, it needs to include the following three dimensions:

(i) Education about the environment

(ii) In/through the environment

(iii) For the environment

In the initial stages of the environmental education movements, the primary focus was on increasing the level of information on the environment, raising society's awareness on environmental issues and developing apt technical and intellectual skills to tackle environmental problems. The environment was considered a subject for investigation and environmental education was fundamentally regarded as education about the environment (A. G. Gough, 1997; Daniela Tilbury, 1994). According to A. G. Gough (1997) and J. A. Palmer (1998), the assumption held was that people would act on environmental problems in their surroundings and prevent further degradation of the environment if they had an understanding of the environment.

When people are equipped with knowledge on matters concerning the environment, responsible environmental behavior is likely to be imparted as they embrace positive environmental attitudes. According to research studies examined by T. J. Marcinkowski (1988), increase in environmental knowledge was found to impact the attitude towards the environment in a positive manner.

With the consequent environmentally responsible behavior from increased knowledge on the environment, there is a higher propensity for the development of action skills. Additionally, enhanced interest and curiosity about nature inspire people to learn about environmental issues which then, according to a model proposed by Dresner and Gill (1994), translate into actions geared towards conserving the environment.

As mentioned earlier, environmental education is effective when viewed in three dimensions, one of which is, in or through the environment. This view came to be when it became evident that environmental knowledge, per se, was not enough as it did not elicit in people the necessary response to environmental degradation as had been expected. This brought to light the fact that there was need for a deeper understanding of the environmental crisis that would take more than just knowledge on the environment (Neal & Palmer, 2003). This deeper understanding could be achieved through practical employment of existing situations as a source of investigation to enhance knowledge (Chi Kin Lee & Williams, 2001). This then introduces the practical aspect of environmental education in which the entity of study is the environment. Through observation of the immediate surroundings and field studies, learners use the environment as a medium for enquiry and discovery.

The objective of the practical aspect in learning in/through the environment is to enhance a deeper understanding of the environment and raise concern for it. This approach is also instrumental in helping students learn how to acquire information, a factor that is presently encouraged in education. Learning in/through the environment also serves as a pertinent source of information for other subjects like language, mathematics and science (J. A. Palmer, 1998).

The practical aspect of environmental education is important but of great importance also is the aspect of instilling moral values aimed at preserving and improving the environment. Environmental education should help develop favorable attitude towards the environment and concern that elicits in people the will to take action to deal with environmental problems or to improve the quality of the environment. This is the essence of contemporary environmental education (Chi Kin Lee & Williams, 2001). In this respect, learning of environmental education by pupils is action-oriented and involves activities like raising awareness, negotiation, persuasion campaigns and rehabilitation of degraded areas (Daniela Tilbury, 1994).

In the quest to solve or counter environmental problems, lower secondary education and more so environmental education has played a crucial role. In addition to enhancing the intellect, creative and practical skills, and the personality of pupils in preparation for their future lives, lower secondary education is also crucial in raising their awareness of the environment and its associated issues. Education is therefore a significant part of life as it facilitates students' acquisition of the fundamentals of general education, develops curiosity, interest in new knowledge, love for work and patriotism.

In circumstances where environmental education has been initiated at an early age, children were later noted to exhibit environmentally responsible behaviors to protect and sustain the environment (Leeming, Dwyer, & Bracken, 1995).

In the endeavor to further environmental education and environmental literacy of future generations, teachers' input is pivotal. They are central figures in ensuring the impartation of sufficient knowledge to students that will facilitate their preservation and conservation of the environment. To effectively ascertain that environmental education is well relayed to students, teachers must of necessity be well informed about the environment and also conscious about sustainable development.

Effective formal environmental education in schools is, to a large extent, dependent on the teachers' comprehension of the subject matter. Irrespective of their specialized area of teaching, teachers should be well versed in and understand the relevant environmental concepts if environmental education is to be promoted and taught across the curriculum. Teachers' knowledge is key to the development of literate students.

Teachers facilitate the learning process and are key figures in aiding not only the acquisition of knowledge by students but also the development of environmentally favorable attitudes. This then calls for an instruction technique that deals with existent environmental problems and building the students' aptitude to improve the situation and in effect, play a part in saving the planet.

Enforcing rules and regulations has been the conventional method used by institutions to support environmentally friendly behavior. This method, per se, does not adequately warrant the embracing of environmentally favorable attitudes and behavior by the learners. Environmental educationists must therefore, of necessity, come up with instruments and methods of instruction founded on community education, responsibility, participation and experimentation. This means that incorporation of outdoor activities must be expedited. As a matter of fact, project based learning method has been noted to be more effective in enhancing concern for the environment especially with lower secondary school learners (Thomas, 2000).

In Balkan countries, environmental education is challenged by lack of appropriate textbooks. This means that new teaching/learning materials have to be developed. Revision of textbooks, provision of new technologies to school and upgrading teachers' professional knowledge and skills are therefore a prerequisite to meaningful education reforms (Sahlberg & Boce, 2010).

Behavioral Learning Theory forms the basis of the lower secondary school education curriculum in Albania. The curriculum is structured in subject form and is objective-based in its design and development. Further, it comprises a core curriculum and an optional (school-based) one. The curriculum integrates, though not adequately, interdisciplinary aspects such as nature study (MES, 2014).

There is an assertion that the curriculum is in accordance with the content and performance standards. However, in the lower 8 years of primary education, the standards for the subjects of study in their entirety were developed and adopted between 2002 and 2004. So far, no revision has been done to fit in the current 9 year initial education system. Moreover, the optional curriculum which makes up 15% of the curriculum is drafted and managed by the school depending on the school’s capability, the pupils’ interest and skills (MES, 2014).

As stated earlier, environmental education at the lower secondary school level is more effective when it is action or project oriented. This is more so when it comes to developing skills and instilling in pupils, environmentally friendly attitudes, habits and values that elicit appropriate action to conserve the environment. Given this fact, involvement of students in practical experiences should be encouraged. A learner-centered curriculum that takes into consideration the interests of the learners in its design is what is needed (Maduewesi, 2003).

In the interdisciplinary arena, Chemistry is an instrumental subject in environmental education. Chemistry aids in scientific explanation and comprehension of environmental issues and in devising environmental quality control, monitoring and remedial action. Chemistry rationalizes the human life and environment relationship via scientific/chemical skills and knowledge (Tanaka, 2000). This should be a matter of interest to teachers of chemistry subject as they are instrumental in exposing learners to the chemistry behind environmental processes and issues.

The study at hand is geared towards examining the influence of Chemistry lessons on students' environmental knowledge and awareness. Also under investigation in this study are other factors such as the Chemistry teachers' knowledge of the content, curriculum, instructional materials and use of environmental opportunities were investigated.

Environmental issues are an integral part of modern day education as clearly depicted in the literature. Raising an environmentally literate society is without any doubt crucial to overcoming the environmental problems that we are facing today. Teaching of Chemistry may be influential in raising the awareness of learners. Conducting the study at hand, it is held, will give valuable insight to professionals charged with the development and revision process of environmental education, environmental education curricula, teacher education programs and instructional materials.

1.2 Statement of the problem

The significance of environmental education becomes more prominent more so in developing countries as environmental problems increase by the day and their structure becomes more complex. Teaching of chemistry in lower secondary schools can come in handy in enlightening the younger generation on the rising environmental problems. This would call for advanced standards and objectives in the chemistry curriculum.

It is also worth noting that revision of the curriculum alone, though vital, is not enough to effectively address teaching of environmental issues. The question whether the teachers have sufficient environmental knowledge and if they possess environmental knowledge while teaching chemistry should be addressed. In addition to evaluating the teachers' environmental awareness and knowledge, the teaching materials should be revised and extra-curricular activities incorporated.

1.3 Aim of the study

Examining the level of influence that Chemistry as a subject has on lower secondary school learners' environmental knowledge and awareness is the rationale for this study. The assessment was done through assessing content analysis of the curriculum and textbooks. This study, in part, purposed to establish the relationship between environmental content knowledge of chemistry teachers in their practice and the students' environmental knowledge and awareness. The correlation between environmental awareness, environmental knowledge and the integrated teaching materials was also under scrutiny. Also under investigation was the effect that environmental related activities such as field trips, cooperation with non-governmental organizations, communities etc. had on students' environmental knowledge and awareness.

1.4 Hypotheses

Main:

"Chemistry subject has significant influence on 8th and 9th grade students' environmental knowledge and awareness."

Sub Hypotheses:

Hyp.1) There is relationship between 8th and 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge.

Hyp.2) There will be significant differences on students' environmental knowledge and awareness if 8th and 9th grade chemistry curriculum includes environmental contents.

Hyp.3) There will be positive effect on 8th and 9th grade students' environmental knowledge and awareness if environmental knowledge is integrated to the instructional materials.

Hyp.4) If chemistry teachers are able to make efficient use of all kinds of environmental opportunities, there will be significant change in the level of environmental knowledge and awareness of 8th and 9th grade students.

Null Sub-hypotheses:

Hyp0.1) There is no relationship between 8th and 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge.

Hyp0.2) There are no significant differences on students' environmental knowledge and awareness if 8th and 9th grade chemistry curriculum includes environmental contents.

Hyp0.3) There is no positive effect on 8th and 9th grade students' environmental knowledge and awareness if environmental knowledge is integrated to the instructional materials.

Hyp0.4) There is no significant change in the level of environmental knowledge and awareness of 8th and 9th grade students, if chemistry teachers are able to make efficient use of all kinds of environmental opportunities

1.5 Research Questions

Main:

"What is the influence of chemistry subject on 8th and 9th grade students' environmental knowledge and awareness?"

Sub Research Questions

- To what extent is <u>content knowledge of chemistry teachers</u> effective on environmental knowledge and awareness of 8th and 9th grade students while teaching chemistry?
- What is the influence level of <u>chemistry curriculum content</u> on environmental knowledge and awareness of 8th and 9th grade students?
- What are the effects of <u>instructional materials</u> for chemistry lessons on environmental knowledge and awareness of 8th and 9th grade students?
- What are the effects of making <u>use of environmental opportunities</u> such as environment trips, cooperation with non-government organizations and communities, etc. on environmental knowledge and awareness of students of 8th and 9th grade?

1.6 Variables

Dependent and independent variables of the study are as follows.

1.6.1 Independent Variables

Independent variables are "the variables that affect (or are presumed to affect) the dependent variable under study and are included in the research design so that their effects can be determined" (Wallen & Fraenkel, 2001:518). Depending on this definition, categorical independent variables of this study are; chemistry teachers' environmental knowledge, chemistry curriculum, instructional materials and environmental opportunities.

1.6.2 Dependent Variables

Dependent variables are "the variables that affected or expected to be affected by the independent variables" (Wallen & Fraenkel, 2001:516). Categorical dependent variables of this study are students' environmental knowledge and students' environmental awareness.

1.7 Significance of Study

The environment we inhabit is currently under threat as natural resources are expended in vast proportions by human beings in the endeavor to increase or improve the quality of life. Suffice to say, public health is in jeopardy and the ecological balance is gradually being lost due to population growth, depletion of resources, pollution, global warming, extinction of animals and plants among other environmental problems.

Given that most of the environmental problems have been attributed to human lifestyles, environmental education is now regarded as necessary. Research studies conducted in various parts of the world have established that while knowledge is important, environmental education also requires change in attitude and behavior. In recent times, countries, both the developing and the developed, have strongly advocated for environmental education and have taken it into consideration when planning school curricula. Apart from governments and various organizations, children, teachers and parents have also taken an interest in environmental education.

Bringing up children who are environmentally literate, with knowledge about the environment and the environmental problems is key to dealing with not only the local but also the global environmental problems that we are facing today. Moreover, children should take note of actions or precautions they can independently take to better their environment, conserve it or remedy existing environmental problems.

When people are scientifically literate, they are able to make out the correlation between science, technology, society and the environment as they possess science process skills. With environmental education, the young people sharpen their critical thinking skills, their appreciation of nature is enhanced and this prepares them for responsible future citizenry. This is because environmental education is expected to raise awareness, impart knowledge, better their skills, habits; values not to mention provide guiding principles on problem solving and decision-making.

To experience a sustainable future in Albania, students and the society at large need to be well informed about the environment and at the same time concerned about the existing and imminent environmental issues. This is where environmental education comes in handy as it sensitizes them on the environment and helps in the impartation of attitudes that are favorable to the environment (UNESCO-UNEP, 1987). Examining the attitudes of people is also essential to unearthing an effective environmental education approach (T. D. UNESCO, 1978).

Given its interdisciplinary nature, environmental education is not offered as an independent unit in the school curriculum. It is, instead, through inclusion of various topics pertaining to the environment, incorporated into other subjects like science and technology education course, social studies course and life studies.

Effective achievement of the goals of environmental education with learners is certainly dependent on the teachers' expertise in this area. Chemistry teachers, in particular, are fundamental to effective environmental education at the lower secondary level. This study, therefore, aims at evaluating the capability of chemistry teachers' to achieve the expectations of environmental education.

Establishing the Chemistry teachers' level of expertise on the environment and the effect it has on the environmental awareness of students in the 8^{th} and 9^{th} grades at the regional level in its entirety, will give insight into the in-service training needs for the Ministry of Education and Sports (MoES).

As far as environmental studies are concerned, this study will also provide guidance in the training of future teachers in institutions of higher learning. It will aid education faculties in establishing the neglected areas and challenging factors in the development of new programs and the appropriate techniques to be employed. This is important because to produce effective teachers, their training at the university must be ingeniously planned and constantly revised to suit emerging needs.

Worth noting about this study is its association with earlier research studies such as Green Pack Education Project which was conducted in conjunction with Regional Environmental Center (REC) , Ministry of Education and Sports, Ministry of Environment, various NGOs, individuals and institutions in Albania. Common factors including aims and sustainability are addressed. The Green Pack Education Project, a multi-purpose education kit tailored for lower secondary school teachers and learners was aimed at increasing environmental awareness and facilitating sustainable development in Albania. In addition, it was to address the approach towards environmental education, form a foundation for expansion and establish the needs by evaluating the existing state of affairs. These aims are in line with this study thereby depicting a shared approach with the Ministry of Education and Sports in the environmental education arena.

In the enhancement of environmental literacy among students, this study can be of use in the strategic planning and integration of environmental education into the lower secondary school curriculum as well as aid in making sure its quality is above board. This study may also come in handy in prospective researches conducted by the Ministry of Education and Sports. In striving to realize the objectives of environmental education and acquainting the partakers with environmental concepts, curriculum developers, science teachers, and textbook authors will encounter valuable feedback in this study on how it can be accomplished. In addition, this study will shed light on how environmental education can be bettered with regard to teaching resources, outdoor experiences such as field trips, teaming up with non-governmental organizations and communities at large.

1.8 Definitions of Terms

Lower Secondary School: is the education institution providing educational service of the level code 2 (lower secondary education) in accordance with the "Law NR.69/2012, on Pre-University Education System in The Republic of Albania"(Ligj-English, 2012; LIGJ, 2012: 4402).

Lower secondary education: consists of three forms, from the seventh form through to the ninth form (Ligj-English, 2012; LIGJ, 2012: 4407).

Environmental Education: refers to "process aimed at making individuals and communities understand the complex nature of the natural and the 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 the quality of the environment (UNESCO, 1977)".

Environmental Literacy: is "essentially the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems (J. Disinger & C. Roth, 1992)".

Environmental knowledge: Environmental knowledge refers to being knowledgeable about the ecology, natural history, environmental problems and issues, and socio-political-economic issues.

Environmental attitude: UNESCO (1977) defined environmental attitudes at Tbilisi Conference as helping social groups and individual acquire a set of value and feeling of concern for the environment and motivation for actively participating in environmental improvement and problems.

Use of Environmental Opportunities: refers to activities that teacher or school administration was organized for the students in the natural areas (trips, outdoor projects etc.), and refers to cooperate with non-governmental organizations, communities, leaders of society and education, etc.

Curriculum: A curriculum document for 8^{th} and 9^{th} grades that presents a framework, objectives and guidelines with the aim of raising literate and informative students who are willing to learn by a behaviorist approach. The goals and objectives are specified, contents and activities are also arranged to match with the learning objectives. The learning outcomes are evaluated in terms of goals and objectives set at the beginning.

Instructional material: means content that conveys the essential knowledge and skills of a subject in the public school curriculum through a medium or a combination of media for conveying information to a student. The term includes a book, supplementary materials, a combination of a book, workbook, and supplementary materials, computer software, magnetic media, DVD, CD-ROM, computer courseware, on-line services, or an electronic medium, or other means of conveying information to the student or otherwise contributing to the learning process through electronic means, including open-source instructional material.

The remaining chapters are structured in the following way. Chapter II reviews the chemistry and environment, environmental education, environmental literacy, outdoor activities and curriculum, drawing on relevant theoretical insights. Chapter III describes the methodology used for the present study on chemistry subject influencing on students' environmental knowledge and awareness in Tirana district Elementary schools. Chapter IV discusses the findings from this study and deals in turn with the four sub-research questions described above. Finally, Chapter V summarizes the key findings and arguments of this thesis, offers recommendations for policy and education, and suggests areas for further research.

CHAPTER II: LITERATURE REVIEW

2.1 Chemistry and the Environment

Depletion and contamination of natural resources by human beings can be traced to the advent of the industrial revolution. No thought was given to the future effects of a devastated environment (Özdilek, 2004). The devastation of the environment we are experiencing today is a result of the qualitative and quantitative increase in its contamination (Ökmen, 2004). Human activities are arguably one of the major causes of environmental destruction (Schultz et al., 2005). Needless to say, these human lifestyles are not sustainable (McKeown, 2002). Exhausted natural resources and damaged environments are a clear indication of unsustainable consumption of the natural resources (Jenkins & Jenkins, 2005).

Many environmental problems have also emerged in developing countries, including Albania, as a result of unplanned developments. Some of the major ones are; solid waste, air and water pollution problems in the urban environment; forest and biodiversity losses due to unsustainable management of the natural sources, including water, air, soil; marine and coastal water pollution; and losses of cultural and natural heritage (Bego, Bino, Vaso, & Kromidha, 2005).

Residents of urban areas are exposed to air pollution because of fumes emitted by exhausts of the ever rising number of motor vehicles, uncontrolled industrial service, smoke emerging from wood or coal fires, odor of unwrap waste or uncontained waste (Hill, 2010). Gases emitted by burning fossil fuels in power stations in order to obtain electricity for home and industrial use also contribute to air pollution (Botkin, Keller, & Rosenthal, 2012).

The desire by human beings to lead comfortable lifestyles such as use of electricity for cooking in their houses, use of motor vehicles and the corresponding activities that make these lifestyles possible, have given rise to gases especially carbon dioxide. This has led to the greenhouse effect. Logan (2006) stated that a significant increase in the greenhouse gases which include carbon dioxide, water vapor, nitrous oxide and tiny amounts of methane has been observed since the beginning of the industrial revolution. These gases block the ground's capability to get cool by trapping thermal radiation released by the surface of the earth and cause greenhouse effect (Wallington, Srinivasan, Nielsen, & Highwood, 2004).

The greenhouse effect leads to global warming of the earth's surface (Gore, 2006). Dire consequences of global warming are bound to be experienced in future. Hill (2010) listed some of them as:

- Melting of the glaciers around the world
- Increase in the sea level that could force people to leave their homes in low-lying countries, make the drinking water salty by infiltrating it and hence destroy coastal ecosystems, as well as the species living there.
- Spreading of diseases such as malaria which is spread by mosquito. Malaria kills millions of people in warm climates.
- Decrease in the coral reefs which create great biodiversity in marines (YILDIRIM, 2008:10-11).

The world's flora and fauna suffer the consequences not only of the global warming but air pollution. Air pollution causes health problems such as poisoning, cancer, irritation of the eye and respiratory system, asthma and heart diseases. Also likely to be observed in vertebrate animals are eye, teeth and bone damage. Plants also suffer damage on leaf tissue and fruit, decrease in their reproductive processes, reduction of oxygen, erosion and water and soil pollution because of the acid rains (Botkin et al., 2012).

Water pollution is also another environmental concern. Hodges (1973) cited major causes of water pollution as:

- Domestic i.e. water coming from homes. People hardly consider how much detergent they use or how often they shower.

- Industrial
- Agricultural. This is waste from sediments, fertilizers and farm animal waste.
- Shipping waste waters. This includes human sewage and other wastes such as oil.

Water pollution endangers aquatic life. Millions of fish die every year as a result of the municipal and industrial wastes. Even worse is that it threatens the health of human beings.

The discharge of sewage to a stream ground leads to reduction of the dissolved oxygen. This in turn affects the number and kind of organisms that will live in it. This effect is more significant in a lake since infiltration of light is important for photosynthetic reaction (Vesilind, Peirce, & Weiner, 2013).

Another factor in environmental issues is soil pollution. Acid rains which are composed of gasses from factories and fossil fuel combustion cause change in the chemical structure of the soil (Krug & Frink, 1983). In addition, fertilizers used for agriculture, pesticides used for harmful insects and plants, agricultural wastes, mineral oils, fuel and petrol from industrial activities and domestic wastes all contribute to soil pollution (Yaron, Calvet, & Prost, 1996).

Discharging garbage in some areas may not only cause soil pollution but also air and water pollution when garbage leak waters mix with the underground water (Özdilek, 2004). Increase in heavy metal and change in the PH value of soil also occur due to soil pollution. Moreover, soil pollution becomes a source for pathogens (Santamaría & Toranzos, 2003).

Unusable solid waste from social and economic activities that do not contain liquid to be fluid, also cause pollution. These include household wastes, paper, carton, plastic, wood, glass , metal etc. Solid wastes that are different from hazardous and radioactive matters are generally referred to as municipal solid waste. These solid wastes could become hazardous to humans as they become habitations for rats, flies and other disease causing vectors found in open dumps (El-Fadel, Findikakis, & Leckie, 1997).

Soil pollution caused by solid waste can be prevented through minimizing the amount of generated waste. The society should also endeavor to use 'environmentally preferable products.' Reusing and recycling products such as glass, paper, alluminium and plastics would also be helpful (Huhtala, 1997).

The overuse of natural resources and contamination of the environment, habitat losses or destruction, change in the ecosystem, invasion of exotic species on the endemic animal and plant population by human beings could lead to losses in the biodiversity (Lorey, 2002). Human activities such as hunting or setting fires to clear ground for use and introducing domestic animals all lead to extinction of some species (Manfredo, 2008).

In spite of the fact that there is massive cutting of trees for sale of wood, fires in the forest and conversion of forests into agricultural fields, all of which cause deforestation, there has been limited reforestation (Kurt, 2004). Trees take in carbon dioxide, leaving oxygen that is required for living. The roots soak up rainwater and this reduces the risk of flooding during heavy rains (Hill, 2010).

Cutting of trees and the consequent destruction of forests leads to land erosion. This in turn increases the risk of global warming because fewer trees mean that less carbon dioxide is absorbed. It also decreases the biological diversity owing to extinction of plants and some species of wildlife (Millar, Stephenson, & Stephens, 2007).

Human activities motivated by the industrial revolution, particularly the consumption of raw materials in large amounts, damaged sources of the earth and caused pollution (Adamson, 1973). Human beings have now exceeded the limits of the carrying capacity of the earth. It is because of this that the term “Sustainable Development” came into focus with the aim of lessening the effects of industrialization on the environment (Yıldırım & Göktürk, 2004).

The first international identification of the issues related to the environment, and maintaining the term sustainable development to provide adequate solution between the terms environment and development was presented in the Stockholm Conference of 1972 (Seyfang, 2003). Further, in a report called “Our Common Future”, the World Commission on Environment and Development (1987) defined the term "Sustainable Development" as meeting the needs of the present without compromising the abilities of future generations to meet their own needs. This term was used again in the 1992 Earth Summit conference held in Rio de Janeiro which aimed at determining the solutions for reducing environmental problems of the world such as climate change, air pollution, deforestation and biodiversity loss (Hill, 2010; J. Palmer, 2002; Robinson, Hassan, & Burhenne-Guilmin, 1993). This gave rise to Agenda 21 which includes strategies for the nations to attain sustainable development (J. Palmer, 2002).

The indicators of sustainable development such as the increase in the amount of greenhouse gasses, concentration of air pollutants, wood harvesting intensity, population living in coastal areas and catch of the major species by the fisheries, use of fertilizer and pesticides, fresh water quality and biodiversity are affected by the humans lifestyles, their ecological footprint and consumption patterns. Thus, ecological footprint and people’s consumption are indicators of sustainable development.

Ecological footprint, which concerns the lifestyles of individuals, regions and the world at large, has been commonly used as the indicator of sustainability (Siche, Agostinho, Ortega, & Romeiro, 2008). It measures the load inflicted by a specific population on nature and it denotes the land area required for sustaining recent source consumption levels and discharged wastes by that population (YILDIRIM, 2008). By it, people recognize the effects of their lifestyles on natural resources (Wackernagel, 2005). Sustainability can be determined through comparative studies on the ecological footprints of a population and the biocapacity of the earth. If the human impact is larger than the biocapacity, sustainability of the environment fails.

There is need to sensitize people on the importance of protecting the environment by changing their lifestyles in favor of the environment otherwise, natural disasters will be inevitable. For sustainable development to be realized, sensitization of the individual and the society on environmental issues is of paramount importance (Cloquell-Ballester, Monterde-Díaz, Cloquell-Ballester, & del Carmen Torres-Sibille, 2008). This can be achieved through environmental education. From an early age, children should be taught to be sensitive to the environment. This enhances their environmental consciousness and sense of responsibility (Başal, 2005). Environmental education is a link between the school, community and the environment (Hacking, Scott, & Barratt, 2007).

2.1.1 The Environmental Situation in Albania

Notable economic growth and reduction in poverty has been realized in Albania. Social amenities such as education and healthcare have also improved not to mention access to water. Owing to the internet, there has been more participation of the civil society in policy-making. However, in spite of these praiseworthy developments, implementation gaps and challenges abound. Many environmental challenges remain unsolved thereby becoming more acute (Krasniqi, 2010).

Intensive construction and the growing demand for private mobility especially in urban areas has led to an increase in greenhouse gas emissions. The current environmental problems in Albania can further be enhanced by climate variability and change (Qiriazi & Sala, 2000).

Insufficient wastewater collection and treatment, leaking sewers and waste dumps are major contaminants of water resources and marine environment more so, close to the cities and industrial sites. This can have dire consequences not only on the environment but the people (Cullaj et al., 2005; Dedej, 2002).

Unsustainable forestry, agricultural and pastoral practices have resulted in soil erosion. Abandoned industrial installations, mining enterprises and waste dumps have, on the other hand, contaminated the land. The low standards of waste management in Albania has arguably enhanced pollution. Worth noting is that many of these environmental problems do not occur in isolation. They are mutually related and inter-dependent (Zdruli, 2005).

Several adopted policy documents have, over the past decades, promoted sustainable development. The main objectives required to realize a healthy ecological environment through the development of sustainable use of natural resources were, for instance, identified by the Environmental Cross-cutting Strategy. Also included in this was the prevention of environmental contamination and degradation and the promotion of environmental protection in Albania. The evaluation of the progress made towards achieving sustainability has been done in various ways since the Rio Conference. Albania’s sustainability situation was also determined and different rankings established (Schläppi, Vyborny, Simaku, & Shutina, 2009).

With an ecological footprint of 0.11 global hectares per person (gha/person) above the world –average biocapacity of 1.8 gha/person (12 billion in total), Albania is an "ecological debtor country" when looked at from a global perspective. The country's ecological footprint is however much larger at the national level given that the biocapacity is calculated to be of 0,87gha/person (Nations, 2012b).

The Human Development Index Ranking in 2011 placed Albania in the 70th position out of 187 countries. The country has a medium high HDI of 0,739. Taken into account in the HDI ranking are the three dimensions of long and healthy life, knowledge and decent standard of living (Nations, 2012b).

In 2012, the Environmental Performance Index (EPI) ranked Albania, with 65,85/100 points, 15th out of 132 countries thus placing it in the category of "strong performers". The EPI is a significant international environmental accounting index ranking countries on performance indicators tracked across policy categories covering both environmental public health and ecosystem vitality. This provides a gauge at the national government scale of how close a country is to establishing environmental policy goals. The most important evaluation is that of the Trend EPI, which is based on performance over the last decade. According to the Trend EPI, Albania has improved by 16 points over the last decade, ranking 4th among the "strongest performers" of the world. The EPI2 has been launched as a complement to the Millennium Development Goals (MDGs) and a counterpart to gross domestic product (GDP), which for too long had been the sole measure of wellbeing (Nations, 2012b).

Evident in these rankings is that even though progress has been made, challenges still abound particularly with regard to making growth more sustainable. Getting the economy right is almost certainly the sure way to achieving sustainability and 23 years after the Rio Conference, this is a fact that is becoming widely acknowledged.

A green economy is what Albania aims at. For this to be realized in the country, the government bears the responsibility of defining regulatory support private sector commitments to green investment and also provide a good basis for development that aims to be economically viable, socially acceptable and environmentally rational. Although much is yet to be accomplished in Albania, considerable progress has been achieved since the 1992 conference in Rio de Janeiro. This progress can be analyzed from the following two angles: "

- The institutional framework for sustainable development in Albania
- The progress toward a "green economy" in the context of sustainable development and poverty eradication" (Nations, 2012b: 8).

Over the reviewed period, there have been positive developments on Albania's international cooperation on environmental matters. These developments have been motivated by a number of factors, top in the list being the prospect of being integrated into the EU. The convergence with the EU *acquis* is one of the main drivers for adopting high environmental standards and ensuring compliance with MEAs (Nations, 2012a).

As far as the development strategy, foreign policy and domestic reforms are concerned, the government considers the process of European integration to be of paramount importance. Moreover, it is a key driver of environmental policies and with the 2008 adoption of a new European partnership with Albania by the Council of European Union, the country is bound to implement MEAs as per the environmental priorities contained in the agreement (Nations, 2012a).

2.2 Environmental Education

2.2.1 Definition of Environmental Education

Nature study, conservation education and outdoor education formed the foundation for the development of environmental education. The Department of Resource Conservation and Planning of The University of Michigan under the leadership of William B. Stapp, held a graduate seminar in which he and his colleagues stated that

> EE is aimed at producing a citizenry that is knowledgeable concerning bio-physical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp, 1969: 31).

Further, Stapp (1969) stated that human beings and the environment cannot be viewed as separate entities given that human beings cannot be detached from the natural setting. With this in mind, helping people understand the biophysical environment and its role in the society, the interdependence of the system including people, culture and biophysical environment, the citizenship responsibilities toward solving environmental problems and motivating people to act were seen as major objectives of EE. In brief, three statements of objectives were identified:

- Knowledge of the environmental problems
- Awareness of possible solutions
- Motivation to take necessary action

The International Union for the Conversation of Nature and Natural Resources (IUCN, 1972) came up with a broader definition stating that EE is

> the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality (J. A. Palmer, 1998: 7).

UNESCO (1975), in defining the goals of EE on levels such as awareness, knowledge, attitude, skills, evaluation ability and participation stated the objectives of EE as follows :

> Awareness: to help individuals and social groups acquire an awareness of and sensitivity to the total environment and its allied problems.
> Knowledge: to help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it.
> Attitude: to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.
> Skills: to help individuals and social groups acquire the skills for solving environmental problems.
> Evaluation ability: to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, esthetic and educational factors.
> Participation: to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems to ensure appropriate action to solve those problems (UNESCO, 1975: 3).

Appropriate environmental education conducted in various venues can help in the realization of these goals. These include non-formal institutions such as nature centers and aquaria and they are primarily for the general public and regular school settings where formal environmental education is given to learners by teachers or external instructors. Environmental education can also be conducted through field trips for students to non formal institutions where they receive information from guides on the site.

Further refining the goals and objectives of EE, Harold Hungerford, Peyton, and Wilke (1980): 43 proposed the main goal for EE as

> aiding citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment.

In their paper for curriculum development for EE, Hungerford and his colleagues presented four levels of sub goals to assist EE program developers and practitioners. These were: "

- Ecological Foundation Level,

- Conceptual Awareness level – Issues and Values,
- Investigation and Evaluation Level
- Environmental Action Skills Level – Training and Application ”.

Preparation of people for their lives as members of the biosphere, learning to understand, appreciate, work with and sustain environmental systems defines environmental education (Meadows, 1989).

The importance of environmental education in conserving the environment cannot be overemphasized. It should be conducted at all levels addressing issues at risk, giving information, skills and values to all people with an aim of developing remedies for environmental problems. The mass media for instance, is an effective tool for creating environmental awareness and knowledge. This is more so with the realization in the 1990s of the need to alert all nations on the consequences of environmental problems and that international standards should be set out for environmental conservation.

Instilling tools or skills to overcome and alleviate environmental problems for the purpose of uplifting the quality of life defines environmental education. This was put forward by Braus and Wood (1993). The knowledge and skills gained through environmental education enhance values and commitment to direct earth’s resources in sustainable ways that keep environment at steady. Staniskis and Stasiskiene (2006) on the other hand were of the opinion that principles of environmental education are an interdisciplinary subject, considered and developed initially for local problems and subsequently adapted by others.

Understanding of the environment is imperative and as Fien (1995) stated, environmental education should be aimed at developing caring and committed attitudes that foster the desire and ability to act responsibly towards the environment.

Various points of views on the aims and principles of environmental education have emerged over the years. For instance, Ballantyne, Fien, and Packer (2001) suggested that if the affective domain of learning such as enjoyment and emotion were to be emphasized in environmental issues, then the students learning would be more productive.

Neal and Palmer (2003), on the other hand, defined environmental education as

> • Education about the environment has the purpose of developing knowledge and understanding about values and attitudes.
> • Education for the environment encourages pupils to explore their personal response to and relationship with the environment and environmental issues. This is linked to the development of attitudes and values, including elements of human understanding and behaviour necessary for the development of sustainable and caring use of the environment.
> • Education in or through the environment uses the environment as a resource for learning. It is a resource which enables the development of a great deal of knowledge and understanding as well as skills of investigation and communication (Neal & Palmer, 2003: 29).

A. Gough (2002): 1201 reported the aims of environmental education as follows:

> • A sense of individual responsibility for the physical and aesthetic quality of the total environment based on a knowledge of general ecological principals
> • An understanding of the impact of the human society on the biosphere
> • An awareness of the problems inherent in the environmental change.

Developing an environmentally literate people that understand the environment they live in, their place in it and related issues is vital. The process of doing this defines environmental education according to a report published by the North American Association for Environmental Education (NAAEE) in 2001.

Recently, Environmental Education was defined as

> the interdisciplinary process of developing a citizenry that is knowledgeable about the total environment in its natural and built aspects and has the capacity and commitment to insure environmental quality by engaging in inquiry, problem solving, decision-making and action.

This definition was put forward by the National Environmental Education Advisory Council (NEEAC) of the U.S. EPA (Landers, Naylon, & Drewes, 2002: 5).

Enlightening citizens on prevention and solutions to environmental problems is the essence of Environmental Education (Day & Monroe, 2000). Within the context of specific realities, the individual should be engaged in an active problem-solving process, encouraged to take initiative, have a sense of responsibility and commitment to building a better future as put forward in the Tbilisi Declaration (HR Hungerford & Peyton, 1994; T. D. UNESCO, 1978). Transformation of the education process can be positively and powerfully affected by environmental education (Courtenay-Hall & Rogers, 2002).

As far as the environment is concerned, instilling responsible environmental behaviors in individuals is the primary goal of environmental education as clearly depicted in the professional literature and in the definitions of Environmental education (H. R. Hungerford & Volk, 1990). Given that it creates awareness of and provides information on the natural environment, Environmental Education is paramount in developing attitudes, skills and motivation for the individual to be an active participant in the prevention of environmental problems while protecting and improving it (Hsu & Roth, 1999). Suffice to say, Environmental Education is interdisciplinary, holistic and life-long in nature (J. A. Palmer, 1998; Schmieder, 1977).

2.2.2 Environmental Education History

Educational and environmental movements were the main forces behind the development and emergence of Environmental Education in the professional literature. Nature study movement, outdoor education movement and conservation education movement (started during 1930s) are the educational movements that basically contributed to the area of Environmental Education and its development. Also enhancing environmental education were the preservation movement, the conservation movement and the environmental quality movement which were environmental movements and all of which were based on different philosophies (ERDOĞAN, 2009).

The foundation of environmental education can be traced back to the 18th century. Environmental concepts such as “social justice” and “human responsibilities” to save the environment and living things were stated by Philosophers and writers such as Goethe, Rousseau, Montessori, and Piaget (Taskin, 2003).

The effects of the Industrial Revolution on the natural and on the social environment did not go unnoticed and as early as the 19th century environmental concerns emerged thereby giving rise to the precursors of environmental education such as Nature Studies, Rural Studies and Field Studies. To further enhance knowledge about nature and protection of the environment, organizations like Sierra Club 1892 and the Audubon Society 1905 were established (Chatzifotiou, 2001).

The Nature Study movement was defined by William Jackman’s Nature Study for the common schools (McCrea, 2006). It entailed exploring an indivisible environment by students through taking them outdoors (Wattchow & Brown, 2011). Creating an interest in the learners about their environment by developing an understanding and respect to the natural environment through direct and first hand observation was the main focus of the nature study movement. This was to be achieved through outdoor activities (Palmberg & Kuru, 2000). Field trips, which give the students a direct experience in the natural environment, enhance their understanding of nature and natural processes (e.g. cause-effect relationship). This outdoor experience helps in achievement of desired results in nature study as opposed to a classroom which is isolated. The nature study movement has played an important role in elementary education that often strives for first-hand discovery (Cronin-Jones, 2000).

In 1948, the International Union for the Conservation of Nature and Natural resources (IUCN) was founded and it was here that the term *environmental education* was first mentioned. The aim of the IUCN was conservation of natural resource. The "commission on education and communication" (CEC) was then established. It aimed at empowering and educating stakeholders on sustainable use of natural resources through strategic use of communication and education (DİNÇER, 2012).

In mid 20th century, Rachel Carson was another highly influential figure. The foundation for early childhood education in environmental education was *Sense a/Wonder,* a 1956 publication. It validated the need for intimate experiences in and with nature (Thompson, 1997).

The national conference on environmental education held in New Jersey in 1968 used the term *"environmental education"* for the first time. This term appeared as a distinct field in literature in the mid 1960s (Roth, 1992). Clay Schoenfeld (1969), who was the editor of the Journal of Environmental education, was one of the early users of the term environmental education. Attempts to define the term environmental education were initiated in those years.

The Journal of Environmental education was founded in 1969 a time when environmental education as a discipline was gaining momentum. In its first publication, William Stapp gave a clear set of goals to be achieved by environmental education to the global population through his article, "The concept of environmental education." An understanding of the biophysical environment and of the interconnection of man and nature by the population was needful. Exposure to environmental problems and potential solutions to these problems was also necessary. Of necessity also was instilling positive attitudes with regard to environment and motivation to take action (Stapp, 1969).

The development of environmental education was highly influenced by various associations and organizations that included IUCN the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Wildlife Fund for Nature (WWF). Embracing environmental education in science education curricula became inevitable for governments owing to the activities of these organizations whose main focus was environmental issues. The United States Congress, following a proposal of environmental Education Act (EEA) in 1969, passed the National Environmental Act in 1970. This was the same year when the first Earth Day celebration was held (DİNÇER, 2012).

In 1970, IUCN and UNESCO organized the 'International Working Meeting on Environmental Education in the School Curriculum' in Nevada, USA. Upon its conclusion, a publication entitled International Working Meeting on Environmental Education in the School Curriculum, Final Report (IUCN, 1970) was produced. Contained in this publication was a standard definition of environmental education that stated,

> "Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality" (IUCN, 1970: 11).

This definition is a clear depiction of the aims of environmental education. Endeavoring to make man understand his relationship with the environment and the consequences of his decisions and actions on it will enable him to make informed choices that protect the environment with all its flora and fauna. This can be achieved by developing skills and the right attitude towards the environment. Enlightening the young people and their families on environmental issues is well addressed by environmental education. Further, it trains them to take immediate action to preserve the environment.

The uniqueness of the 1970 meeting in Nevada is that it discussed environmental education as opposed to education for conservation only. It was the first international event to do this. Topics discussed included: "

a) Concepts and Elements of Environmental Education

b) School Facilities, Staff, Space, Fixtures, Instruments and Equipment

c) School Outdoor and Community Facilities

d) Starting and Improving Environmental Curricula" (Chatzifotiou, 2001).

Shifting focus from education about conservation or field studies to education about the environment in the Nevada meeting is significant in that it firmly established the term "Environmental Education" and defined it. This led to its acknowledgement as an integral part of the school curriculum.

The 1972 Stockholm conference on the Human Environment saw the commencement of a more global concern for environmental issues. Before then, many of the environmental issues raised such as marine pollution, conservation of natural resources and protection of migratory birds were a result of industrialization. Missing from the list of concerns were environmental issues pertaining to developing countries (Kennet, 1972).

Pertinent environmental problems existed in the developed as well as developing countries and this is a fact that the Stockholm conference recognized. Action to alleviate or counter the increasing environmental problems was deemed necessary and environmental education was considered a crucial tool through which this could be achieved.

To assist in the betterment of the human environment, an action plan divided into three categories and incorporating 26 principles was devised at the Stockholm conference. Information concerning the state of the world environment, the environmental problem and the management techniques comprised the first category while the second was titled Environmental Management (Holdgate, Kassas, & White, 1982). The third, which was further divided into three sections, was titled Supporting Measures. The first section dealt with education, training and public information while the second was to address organizational arrangements. Financial and other types of assistance formed the third section.

The United Nations Environmental Programme (UNEP), a significant organization in international environmental affairs, was established in 1975. This organization which is, arguably, a by-product of the Stockholm conference is concerned with environment and development, environmental awareness, Earthwatch, oceans, water, terrestrial ecosystems, arid land and desertification control. Also established by UNEP and UNESCO in 1975 to promote the exchange of information and experiences in the field of environmental education was the International Environmental Education Programme, IEEP (Chatzifotiou, 2001).

Deployment of personnel to the Paris UNESCO headquarters to work with the international community was another big achievement of the 1975 Stockholm conference. These personnel were expected to involve educators and governments in the infant field (Fensham, 1978).

The discussions of the conference saw the birth of the 1975 Belgrade Charter titled A Global Framework for Environmental Education which was to see to it that environmental education was developed by defining directions in which this could be achieved. Further, it aimed at discussing trends and challenges related to environmental education. In its report, the Belgrade Charter (UNESCO, 1975) stated that

> "The objectives of environmental education relate to helping both individuals and groups: to acquire awareness of and knowledge about the environment and its allied problems; to acquire new social attitudes of concern that will motivate active participation; to acquire the

skills for solving problems; to be able to evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetic and educational factors; and to participate in appropriate action to solve problems. " (Chatzifotiou, 2001)

Further, the Belgrade Charter gave the guiding principles of environmental education stating that it should:

"1.consider the environment in its totality: natural and man-made, ecological, political, economic, technological, social, legislative, cultural and aesthetic;
2.be a continuous lifelong process both in-school and out-of-school;
3.be interdisciplinary in its approach;
4.emphasize active participation in preventing and solving environmental issues;
5.examine major environmental issues from a world point of view, while paying due regard to regional differences;
6.focus on current and future environmental situations;
7.examine all development and growth from an environmental perspective;
8.promote the value and necessity of local, national and international cooperation in the solution of environmental problems"(UNESCO, 1975: 4).

In 1977, UNESCO organized the first Intergovernmental Conference on Environmental Education. A total of 66 UNESCO member states and representatives from numerous non-governmental organizations attended this conference which was held in Tbilisi, Georgia USSR. This was a significant event as far as environmental education is concerned. The Tbilisi Conference stated that environmental education ;

- "Is a lifelong process
- Is inter-disciplinary and holistic in nature and application
- Is an approach to education as a whole, rather than a subject
- Views the environment in its entirety including social, political, economic, technological, moral, aesthetic and spiritual aspects
- Recognizes that energy and material resources both present and limit possibilities
- Encourages participation in the learning experience
- Emphasizes active responsibility
- Uses a broad range of teaching and learning techniques, with stress on practical activities and firsthand experience
- Is concerned with local to global dimensions, and past/present/future dimensions
- Should be enhanced and supported by the organization and structure of the learning situation and institution as a whole
- Encourages the development of sensitivity, awareness, understanding, critical thinking and problem-solving skills
- Encourages the clarification of values and the development of values sensitive to the environment
- Is concerned with building an environmental ethic" (UNESCO, 1977: 27).

In defining environmental education, the combined statements of the Belgrade and Tbilisi conferences have become the most universally acceptable given that they address not only the end goal but also the experiences, strategies, and processes important for developing environmental literacy (Hart, 1981).

In 1987, the Intergovernmental Congress on Environmental Education and Training was held in Moscow through the combined efforts of UNESCO and UNEP (UNESCO-UNEP, 1987). The needs and priorities for developing EE and training were put into focus in the congress document. Also catered for in the document was an international strategy comprising 42 international actions for EE and training for 1990s (UNESCO-UNEP, 1987).

To provide a framework, guidelines and examples of environmental education for middle schools, a Prototype Environmental Education Curriculum for Middle Schools was published in 1989 with the support of United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations Environment Program (UNEP). It was later revised in 1994 (DİNÇER, 2012).

In laying out the goals of UNEPMS curriculum, consistency with the categories of objectives in Tbilisi Conference Report (1978) was observed. They were a modification of those developed by Hungerford, Peyton, and Wilke in 1980. An attempt to lay out ways to effectively tackle the core of environmental education was made while also addressing effective ways to deal with grave concerns that people of all ages encounter and to take action. With regard to creating a middle school curriculum, which caters for learners aged ten to fifteen years, precise proposals were put forward on the methods that can best achieve this (HR Hungerford & Peyton, 1994).

In the broad spectrum of environmental literacy, the UNEPMS curriculum integrated cognitive knowledge and skills and laid out the goals as: “Ecological foundations; Issue awareness; Issue investigation and evaluation; and Issue resolution” (DİNÇER, 2012: 19). Foundations, awareness and focus on conceptual awareness of ecological principles and environmental issues were addressed in the first two goals while the last two dealt with the development and application of necessary skills to investigate and evaluate environmental issues and taking action to solve them.

The UNEPMS represents a revision of that earlier document, and attempts to reflect recent changes within the environmental education community and, in a larger sense, the global political climate. It is evident from numerous public, private, and governmental policy statements, position papers, and reports that a new concept is emerging, one that will have far-reaching significance at local, regional, national, and international levels. That concept is called "sustainable development" (H. R. Hungerford, 1989: iii).

In spite of the fact that the environmental curriculum was designed for middle school learners, the objectives are applicable to all age groups. Educators can use them for elementary students taking them as maximum objectives necessary to acquire before middle school or as minimum objectives to be acquired before start of high school education (Harold Hungerford et al., 1980).

The desire and readiness to live in a manner that protects the environment will be realized when people are enlightened on their environment, how it works and their dependence on it. This was the basis on which *Caring for the Earth: A strategy for a Sustainable Living* (U. IUCN, 1991) was established. *Caring for the Earth,* published by IUCN, UNEP, WWF in 1991, is a revised and updated version of the *World Conservation Strategy* (U. IUCN, 1980).

Conflict between human development and conservation of natural resources does not have to occur. The two can go hand in hand. This was the main message of the aforementioned publication. Principles that promote sustainable living and activities that can transform them into action were highlighted. The principles, as mentioned in the publication are,

> "...respect and care for the community of life, improve the quality of human life, conserve the Earth's vitality and diversity, minimize the depletion of nonrenewable resources, keep within the Earth's carrying capacity, change personal attitudes and practices, enable communities to care for their own environments, provide a national framework for integrating development and conservation, and forge a global alliance " (U. IUCN, 1991: 3).

Joint initiatives that promote action plans should be established between governments, non-governmental organizations and the media with their goals being to

> "explain why a sustainable society is essential and to provide all citizens with the values, knowledge, skills and incentives to help them achieve and flourish in it. The plans should promote both the principles of sustainability and the actions that flow from them. They should be implemented through both the educational system and public campaigns" (U. IUCN, 1991: 53).

In its conclusion, *Caring for the Earth*, proposed actions that could help its implementation. The need for people, communities and nations to change in order to live in harmony with nature was well communicated this publication.

'The Earth Summit' organized by the United Nation, in Rio de Janeiro, Brazil in 1992, was another important event coming twenty years after the Stockholm conference which was the first global environmental conference. It was in the Earth Summit that the following documents were signed: "

> 1.The Rio Declaration: a statement of principles
> 2.Agenda 21: a framework for activity into the 21st century addressing the combined issues of environment protections and fair and equitable development for all, and includes the creation of a new Commission for Sustainable Development
> 3.A Framework Convention on Climate Change
> 4A Framework Convention on Biological Diversity
> 5.A Statement of Principles on Forests." (ERDOĞAN, 2009)

Of major concern at the Rio conference were human beings given that they are the essence of sustainable development. It is with this in mind that principles and programs for action geared towards sustainable development came up at the Rio Conference. In Agenda 21 chapter 36, which addressed Education, Aware and Training, there was a comprehensive attempt for action focused on establishing Education for sustainability (E. Summit, 1992). This chapter was designed in line with the principles presented in Tbilisi Conference in 1977 and Tbilisi Conference Report published in 1978. This chapter emphasizes:

> "Education is critical for achieving environmental and ethical awareness, values and attitudes, skills, and behavior consistent with sustainable development and for effective public participation in decision making. Both formal and non-formal educations are indispensable to changing peoples' attitudes so that they have the capacity to assess and address their sustainable development concerns." (Plenary, 1992)

United Nations conferences examining the relationship between human rights, population, social development, women rights, human settlements and the need for environmentally sustainable development were highly influence by the Earth Summit. The need to consider any environmental impact while undertaking economic decisions, and revising the international and national plans and policies accordingly, was seen as a necessity. Agenda 21, which was declared in this conference, addressed sustainable development and gave the goals of environmental education as

> "Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues. While basic education provides the underpinning for any environmental and development education, the latter needs to be incorporated as an essential part of learning. Both formal and non-formal education is indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns. It is also critical for achieving environmental and ethical values and attitudes, thinking skills and active behaviour consistent with sustainable development and for effective public participation in decision-making. To be effective, environment and development education should deal with the dynamics of both the physical/biological and socio-economic environment and human (which may include spiritual) development, should be integrated in all disciplines, and should employ formal and non-formal methods and effective means of communication." (Agenda21, 1992)

To tackle environmental issues and to promote sustainable development, prominence should be given to enlightening people on the environment, equipping them with relevant skills and motivating them to act accordingly when need be. This is made clear in Agenda 21 which is considered a landmark in environmental education and has become an inspiration to many in this field. The objectives of environmental education state in Agenda 21 demonstrate how to integrate environmental concepts, skills and attitudes into a curriculum and this had a significant effect on environmental education. One of the recommended areas is “re-orienting education towards sustainable development” (Agenda21, 1992).

UNESCO has endeavored to accelerate reforms mainly on education for sustainable development, raising public awareness and promoting more investment in education since the Rio conference (United Nations Educational & Organization, 2002). In the 1990s, major UN conferences emphasized the significance of education for sustainable development which is rooted on four independent systems namely, the biophysical, economic, social and political concerns (UNESCO, 1997; United Nations Educational & Organization, 2002). The concept of education for sustainability was brought to the fore by UN conferences held between 1992 and 1997 which developed, enriched and reinforced the vision of education and public awareness.

In 1997, UNESCO organized another conference in Thessaloniki, Greece which focused on refining the concept and message of education for sustainable development. In addition to promoting action at international, national and local levels, the roles of education and public awareness were emphasized in this conference (UNESCO, 1997). Reorientation of education for sustainable development was at the heart of this event leading to the following statement in the declaration:

> “The reorientation of education as a whole towards sustainability involves all levels of formal, non-formal and informal education in all countries. The concept of sustainability encompasses not only environment but also poverty, population, health, food security, democracy, human rights and peace. Sustainability is, in the Final analysis, a moral and ethical imperative in which cultural diversity and traditional knowledge need to be respected” (UNESCO, 1997: 2).

In Europe, another significant event was organized by the European Commission in Brussels in May 1999. The theme of this event was 'Environmental education and training in Europe'. The objectives of the conference were to “

- put the opportunities offered by EE&T on the agenda of decision-makers within the

European Commission and national governments
- exchange information on present and future roles of EE&T in Member States
- discuss in that light the added value of activities at European level
- explore new challenges for the role of the Commission
- stimulate networking and informal contacts among experts from the Commission and Member States." (Hesselink & van Kempen, 1999: 3)

The World Summit for Sustainable Development (WSSD), the third conference on Environment and Development organized by the United Nations was held in Johannesburg in 2002 (J. Summit, 2002). It is also referred to as the Johannesburg Summit. The five major areas discussed in this conference were:

1. Water and sanitation
2. Energy
3. Health and environment
4. Agriculture
5. Biodiversity and ecosystem management – Also known as "WEHAB" (UN-Johannesburg, 2002).

Many international and national conferences and meetings raised the need for environmental education for sustainable development leading to its international implementation. In 2002, the United Nations General Assembly proclaimed the Decade of Education for Sustainable Development (UNDESD) for the period 2005-2014 (Combes, 2005).

For sustainable development to be realized, education is mandatory. The assertion in many conferences over the years of the importance of education in the quest for sustainable development gives credence to this statement. The foundations for Education for Sustainable development (ESD), as put in the UNDESD International Implementation Scheme, are pegged on two main concerns of the united Nations (UN): Quality basic education and Environmental education for sustainable development

(Combes, 2005; Sector, 2005).

2.2.3 Environmental Policies and Sustainable Development in Albania

The constitution of the Republic of Albania embraces the concept of sustainable development with an article declaring that the state aims at "

> • a healthy environment and ecologically sustainable environment for the today and future generations
> • a rational use of the forests, waters, pastures, and of the other natural resources on the base of the sustainable development" (CONSTITUTION, Chapter V, Article 59).

2.2.3.1 Laws Integrating Principles of Sustainable Development

To ascertain compatibility of new laws with the principles of sustainable development, Albania's national legislation has been developed in accordance with the acquis communautaire. Given that the country's focal strategic and political objective is integration into the European Union, a good Legislative Corpus on Environment and Sustainable was adopted as it is key to achieving this objective. In recent years, approval of new laws has been influenced by the direct transposition of the respective EU directives (Nations, 2012b).

Immediately after the Rio Conference of 1992, Albania approved the "Law on Environmental Protection". This was the first and single environmental law and it remained so for almost ten years. In 2002, there was approval of a new "Law on Environmental Protection" but the core Environmental Directives by EU were fully incorporated by in 2011 following another approval of a new "Law on Environmental Protection" (Zaganjori, 2014).

The regulate the role of stakeholders in the field of environmental protection, the law on Environment Impact Assessment (EIA) was passed in 2003. Prior to the approval law on Environmental Assessment, significant challenges were experienced with regard to environmental permits in this area. Further on in 2011, a new law on

EIA was approved. This new law partially transposed EU directives in this field. Still on public consultations currently is the "Law on Sea" which is also another significant law in the environmental field and expectations are that it will be approved (Nations, 2012b).

In accordance with the objectives of the EU, Albania seeks to have 20% of its territory as Protected Areas and in 2003; the Albanian "Law on Protected Areas" was approved. This law regulates the process of the protection of the already existing Protected Areas, and of defining new ones. However, given the challenging situations in some areas of a number of National Natural Parks, some NGOs are not optimistic about implementation of the Law on Protected areas as they doubt the ability of the Albanian institutions to do so (DIRECTORATE, 2010).

To conserve and ensure the sustainable use of biodiversity, the "Law on Biodiversity Conservation was passed in 2006. In addition to providing a legal basis for this to be done, the law is instrumental in achieving the targets of the Convention on Biological Diversity as it is founded on the objectives of this and other biodiversity related conventions that Albania is associated with. It is also in line with other EU directives such as Habitat and Wild Bird Directive. Mechanisms for biodiversity planning such as Biodiversity Strategy and Action Plan, biodiversity inventorying and monitoring network, emergency plans and transboundary impact assessments are identified in this law. Also identified are three protection categories namely; protected, specially protected and degraded ecosystems, habitats and landscapes (Metaj, 2007).

A high standard of protection of the environment in its entirety is needed for the sake of human health and to improve the quality of life. For this purpose, Albania enacted the "Law on Environmental Permitting" in 2011 with the aim of preventing and controlling pollution resulting from some activities. It established measures permitting the operation of certain groups of polluting activities, measures designed to prevent or, where that is not practicable, to reduce emissions to the air, water and land. Also included are measures concerning waste (Nations, 2012b).

Prevention or reduction of the harmful effects of waste generation and management is of paramount importance in the protection of human health. For this reason, the “Law on Integrated Waste Management” which transposed the Framework Directive of EU for wastes came into being in 2011 (Turkeshi, 2014). This law also aimed at reducing the overall effects of the use of resources, improving the efficiency of such use ensuring proper waste management. Entrenched in this law however, is an article that permits the importation of the “waste originated materials” according to the “Green List Waste”. This is waste that is considered non-hazardous. The law allows importation of such waste for recycling under a lower level of control to EU/OECD countries and some no-OECD countries. Some NGOs have opposed this article allowing such importation (Nations, 2012a, 2012b).

In 2006, a law majorly touching on the Renewable Energy concessions such as small hydro power wind energy was passed. This is the “Law on concessions”. Enhancement of the development of Renewable Energies more so through involvement of private initiatives was also catered for in this law (Durim, 2014). And to ensure the rational and sustainable use of land and natural resources, the “Law on Land Use Planning” was enacted in 2009 (SALLAKU[1] et al., 2009).

2.2.3.2 Development of the Environmental Institutions

In 1993, the “Committee for Environmental Protection”, the pioneer environmental institution in Albania was founded with an advisory role to the government. The Ministry of Environment was then created in 2001 and in 2005 forestry and water administration was integrated into it. It then became known as the

Ministry of Environment, Forests and Water Administration (MoEFWA). This ministry was tasked the drafting and proposing policies, strategies and action planning for the protection and administration of the environment, forests, waters and fisheries in order to achieve sustainable development, and to improve the quality of life and enable the country to join the European Union. Apart from proposing measures that protect and preserve the environment, forests and water resources, MoEFWA also oversees the implementation of water and forestry policies. The ministry uses participation, initiation and coordination of the activities that lead to long-term developments and well being by protecting nature and raising public awareness to achieve its mandate. In addition, MoEFWA is also charged with implementation of relevant national policies, the definition of the priority environmental and forestry investments, the development of national research programs in the environmental field, and the coordination of environmental protection-related activities of other ministries and local authorities. MoEFWA has however suffered challenges due to non-sufficient quantity of investments in priority sectors and the segmentations of the interventions such as investments in building of landfills which is under the Ministry of Public Works and Transportation (Nations, 2012b).

For the purpose of issuance of environmental permits, inspection and monitoring, executive territorial agencies otherwise known as Regional Environmental Agencies (REAs) had been formed in 2002. To further monitor the environmental situation of the country, the new Agency of Environment and Forests was created in 2006. Developing new policies to protect and improve the environment was also part of its mandate. This agency was later changed to the National Environmental Agency which also incorporated the REAs following the enactment of the Law on Environmental Protection in 2011 (Nations, 2012b).

To address the energy sector, the National Committee of Energy was founded in 1992 but it was later changed to the National Agency for Energy in 1998. Its purpose was to advise the government on energy related matters. After the formation of the National Agency for Natural Resources, the National Agency for Energy came under to ensure an all inclusive perspective on the management of natural resources. The aim of the National Agency for Natural Resources was to develop and supervise rational exploitation of natural resources in accordance with the policies of the government. With regard to mining, hydro-carbons and energy, the agency works in conjunction with the relevant government structures to develop policies to regulate this field. In addition, it also monitors the post-exploitation effects on the natural resources. Given that sustainable use of energy resources is at the core of this agency, it also monitors the concessionary contracts for Hydropower Plants (Hema & Malollari, 2002; Nations, 2012b).

2.2.3.3 An Overall National Strategy for Sustainable Development

In the Republic of Albania, all strategies for sustainable development are drawn from the National Strategy for development and Integration, (NSDI, 2007-2013) which was approved in 2006. It is viewed as the de facto instrument of planning for sustainable development in Albania, coordinating the objectives of development and those of integration into the European Union. The NSDI is drawn from the Agenda 21 which is taken in two different contexts in Albania i.e. the central and the local. The NSDI is the central. In its operations, the NSDI has been challenged by incomplete implementations. It has also been perceived as insufficient by some stakeholders who have argued that it should be conceived as the "National Strategy for Sustainable Development and Integration" (Nations, 2012b).

The "Agenda 21s" have experienced better organization at the local level where they are translated into “Local Environmental Action Plans”. With the assistance and support of NGOs such as REC, Milieu Kontakt, etc and International organizations like UNEP, UNDP, etc, Local Environmental Action Plans have been designed at the municipality, commune or qark levels and approved. These plans must however be supported with political goodwill and finances (Nations, 2012b).

In order to effectively deal with the complex environmental issues of this century and also to change the perception of people on matters of environmental protection in a wider context than experienced before, several measures are being taken. In addition to enhancing inter-ministerial and inter-institutional co-ordination, technical specialization at the Ministry of Environment, Forestry and Water Administration and other environmental organizations at national, regional, and local levels is being strengthened (DIRECTORATE, 2010; Nations, 2012a, 2012b).

2.2.3.4 International Conventions and Protocols Signed and Supported by Albania

Albania has signed a large number of international conventions and committed to obligations deriving by them.

- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Aarhus Convention, Aarhus, 1998
- Convention on Biological Diversity (CBD), Nairobi, 1992.
- Energy Community (Energy Community South East Europe Treaty - ECSEE)
- Espoo Convention on Environmental Impact Assessment in a Transboundary Context, Espoo, 1991.
- Montreal Protocol on Substances That Deplete the Ozone Layer, Montreal,

1989.

- Stockholm Convention Stockholm Convention on Persistent Organic Pollutants Stockholm, 2001.
- The United Nations Convention to Combat Desertification
- Convention for the Protection and Development of the Marine Environment and Coastal Region of the Mediterranean Sea, Barcelona Convention, Barcelona, 1976.
- Protocol for the Prevention and Elimination of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea
- Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources and Activities
- Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea
- Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and Their Disposal Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean
- Protocol for the protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and the seabed and its subsoil.
- Protocol on Integrated Coastal Zone Management in the Mediterranean
- Convention on the conservation of European wildlife and natural habitats
- Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean

- The Convention on Biological Diversity, 1992
- The Cartagena Protocol on Biosafety, of the Convention on Biological Diversity
- International Convention for the Conservation of Atlantic Tunas (ICCAT)
- Agreement on the Conservation of African-Eurasian Migratory Waterbirds
- The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS), Bonn, 1979.
- Convention on the International Trade in Endangered Species of Wild Flora and Fauna, (CITES), Washington DC, 1973.
- Ramsar Convention on Wetlands of International Importance, especially as Waterfowl Habitat, Ramsar, 1971.
- Convention on Long-Range Transboundary Air Pollution (LRTAP), Geneva, 1979.
- Framework Convention on Climate Change (UNFCCC), New York, 1992.
- Kyoto Protocol of UNFCCC, Kyoto, 1997
- Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985, including the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal 1987.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel, 1989.
- Protocol to the 1979 Convention on long-range transboundary air pollution concerning the control of emissions of nitrogen oxides or their transboundary fluxes (NOx Protocol)

- Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at Least 30 Per Cent
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Rotterdam, 1998.
- Stockholm Convention on Persistent Organic Pollutants, Stockholm, 2001.
- United Nations Convention on the Rights of the Child (CRC), 1992
- Framework Convention for the Protection of National Minorities (FCNM), 1995
- The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), 1979
- Convention on the Rights of Persons with Disabilities, 2009
- International Treaty on Plant Genetic Resources for Food and Agriculture, ratified by Albania in 2007

2.2.3.5 NGOs and Public Participation in Decision-making

In dealing with environmental issues at national and local levels, there has been advanced public participation. MoEFWA engages the public in discussions of new laws by organizing meetings with interested members of the public and NGOs. New draft laws are also regularly published on MoEFWA's website for public consultation (Nations, 2012a).

NGOs have often prepared policy papers which have then been discussed and approved by several interested organizations before being presented to MoEFWA for consideration. This can be considered a productive exercise taking into consideration that it has sometimes led to the development of future legislation or regulations. Suffice to say, great advancements have been realized as far as involving NGOs in the decision-making process is concerned. Attesting to this fact is the enactment of the 2011 "Law on Environmental Protection" which was developed in conjunction with NGOs (Nations, 2012a).

NGOs can play a big role in raising awareness among the local communities and assisting them in tackling specific local problems (Calvano, 2008). However, the presence of NGOs at the local level has been minimal. In the national NGO scene, REC Albania plays a vital role. In addition to supporting local NGOs, it is credited with the implementation of various projects in the areas of environmental education, access to information, public awareness and support at the local level (Nations, 2012a).

Through the support of the World Bank, there have been minor improvements in public participation more so in local government work. In a bid to strengthen public participation in local governance a project was initiated in with the Urban Research Institute in 2004. This two-year project specifically targeted participation in areas of budget formulation and execution and monitoring. It also aimed at enhancing communication between citizens and their local governments (Nations, 2012a).

Despite concerted efforts, strengthening public participation in the execution of a policy cycle in its entirety i.e. from framing, development and implementation is still a big challenge in Albania. Needless to say, it should be set as a priority in future (Jianping et al., 2014).

In the 1990s there was a rapid increase in the number of environmental NGOs. This is however not the case now. They are fewer in number and mostly centered in big cities like Tirana. Uncertainty surrounds the future of environmental NGOs and REC in Albania after 2015 as countries such as Austria, the Netherlands, Sweden and Switzerland which have usually supported them financially wind down their contributions. Since the government of Albania does not offer financial support to environmental NGOs, they have always depended on the aforementioned countries to fund their activities. Persistent shortage of funds is likely to affect collaboration between the various NGOs. Setting up NGOs is also proving to be a challenge because of legislation. There is lack of clarity in the law, specifically, the 2001 Law No. 8788. It does not distinguish the financial conditions required in the registration of an economic activity and a non-economic such as an NGO (Nations, 2012a; Xhindi, 2013).

Currently there is no code of ethics governing NGOs and efforts to initiate one have not been fruitful. As a result, imprecision marks the achievements or impact of the activities of most of the NGOs. The few available websites of NGOs are not regularly updated and lack the necessary information. Transparency is however practiced by a few NGOs who also publish their annual reports. Capacity building activities are now being conducted for NGOs. For this purpose, The Technical Assistance for Civil Society Organizations (TACSO) and REC have developed training manuals for NGOs with assistance from the EU, World Bank and the Netherlands. TASCO, with support from EU organizes capacity building courses for NGOs in Albania. They cover, among other things, media-related issues, cooperation between NGOs and local government, legal and financial issues and taxation issues (Nations, 2012a).

In June 2002, the Ministry of Environment and forty two NGOs that were considered most active at the time signed a memorandum of cooperation. This has served to greatly boost the cooperation between MoEFWA and the major environmental NGOs in Albania. In 2011, MoEFWA prepared a new Memorandum of Understanding in which is to be signed with the NGO Ecolëvizja, a network of 37 NGOs of various profiles covering all of Albania. On the drafting table in the Ministry is another memoranda of cooperation to be signed with other environmental organizations (Nations, 2012a).

2.2.4 Environmental Education in Albania

In a bid to improve the formal education system in Albania, major reforms are being undertaken. Several projects have been implemented and others are still underway to enhance the school curriculum from to primary to tertiary level. Handbooks and other teaching resources for students and teachers of different stages of education have been produced (Haxhihyseni, 2014).

Introduction of environmental education in the national curriculum on a formal basis was established following the signing of a Memorandum of Cooperation between UNICEF, the Netherlands, the Ministry of Education and Science (MoES) of Albania and MoEFWA in 2005. The Netherlands facilitated the first project which pertained to the secondary school level and with the support of REC Albania, it was implemented (Nations, 2012a).

Abstract teaching techniques harmonized with real practical activities were applied in environmental education at the elementary level, initially through a number of selected schools across the country in this project partnership with UNICEF. Diverse environment-related activities in schools such as eco-gardens, collection, separation and re-use of paper and glass etc, were implemented with the encouragement of UNICEF which had initiated the small grant projects (Wood, 2006).

Environmental education has great potential for growth in Albania at all levels of education. This can, to a great extent, be attributed to the reforms in the national curriculum. Alongside the compulsory subjects, students at different levels now have the option of selecting environment related topics of interest for study (Hall, 2004; Sokoli & Doka, 2004).

Certification of “green schools” supported by local governments is the vision of future projects. To sustain the process, local governments would be expected to assist the schools by financially supporting them through micro-grants (Dalvi, 2015).

Albania has good potential to transform the education system, through the use of “green” contemporary technologies. Albania, with investments from both the international community and the national government launched the construction of "green" schools or the transformation of existing ones in green schools. Launched “green schools” project helps the economy of the country, in addition to providing significant savings in maintenance costs and school administration, creating jobs, contributing to the preparation of a competitive work force in the field of what is called "green economy". Ministry of Education and Sports presented, the study findings "green schools and the effective use of energy"evaluated by Arizona State University’s Walton Sustainability Solutions Initiatives in June 2015. During the presentation of the Government's new project for green schools, Minister Lindita Nikolla said that the pilot project conducted by the Ministry of Energy and Industry in 10 schools in the country, in the district of Lushnja and Lezha district, in the period 22 July 2014 to 22 January 2015, has given surprising results such as the reduction of energy losses due to thermal insulation 50%; reducing losses from windows 45%; Energy savings due to efficient lighting at 80%; lighting flow increased 70%; the use of solar panel will save electricity by 60%. These changes in schools using the technologies of "green" will bring: improved health and safety conditions in the school, will ensure uninterrupted power, will create more than 220 thousand jobs and increase GDP by 880 million dollars (MAS, 2015).

In a bid to introduce fundamental themes of Education for Sustainable Development (ESD) in Albania’s education system the National Strategy and Action Plan for Education was enacted. This marked the starting point of transposing into the national context, the UNECE Strategy on Education for Sustainable Development which was adopted by all UNECE members, Albania included, in 2005. The strategy aimed at promoting ESD in the region. In Albania, the National Strategy and Action Plan for Education served as the central point of implementing ESD in the country. The country also established a mechanism for inter-agency coordination (Nations, 2012a).

With the support of international donors and international organizations, practical implementation of the ESD strategy started to take shape in Albania. In 2003 for instance, the Green Pack initiative which has vast experience in the UNECE region was launched. With the support of REC Albania, the Regional Environmental Center for Central and Eastern Europe (REC) the Green Pack initiative was implemented (Tadic, 2004). The initiative was part of the UN Decade on Education for Sustainable Development. To guide teachers of environmental education in their lessons, more so on objectives and teaching methods, REC Albania, published a teacher’s handbook in 2006. Contained in the handbook were lesson plans on 22 environmental topics and information relevant to each topic particularly that which was relevant to Albania (O. F. Yıldırım, Akar, & Yıldırım).

In about 1,500 secondary schools across the country, teachers of various subjects have been using the Green Pack since early 2007. REC monitoring supported by REC and teachers’ feedback report that Green Pack reaches 2,000 teachers and 100,000 students every academic year (Mindjov & Atkinson, 2013).

In 2011, MoES, the National Agency for Education and Vocational Training and Qualifications, and KulturKontakt Austria organized a national conference on sustainable development. The conference pertained to the ESD Strategy implementation and mainly dwelt on environmental education. Further on in 2012, plans were underway with REC Albania for an annual conference to enhance conformity to the ESD Strategy obligations. The conference was to include teachers and specialists on environmental education and the needs of national education with regard to the Strategy (Nations, 2012a).

The growth of the environmental education curricula and the associated school activities is predictable for the period 2012 to 2016 owing to the Program of cooperation between the government of Albania and UNDP. Raising the capacity of mainstream environment into national policy frameworks and ensuring participation and expansion of ESD in schools are some of the objectives of this program. It also hopes to enhance public awareness of environmental issues (Cinga, 2014; Nations, 2012a).

For adults who are interested in learning about environmental requirements with regard to economic activities, MoES and MoLSAEA provides short term courses through the program, Education for All. These courses are offered to companies, small enterprises and entrepreneurs. Generally, informal (adult) environmental is not available in Albania even though the Education for All program is capable of assisting people to acquire environmental knowledge (Nations, 2012a). Protection of the environment and sustainable use of resources can be addressed by educating people particularly the local communities. This can be achieved through a regular and long term adult education program which would be instrumental in enlightening the community on the benefits of environmentally friendly practices like ecotourism and ecoagriculture (Sumner, 2003; Walter, 2009).

2.2.5 Environmental Education Studies

Raising students' potential to respond accordingly to environment concerns is by and large the objective of environmental education. This is influenced by the types of learning experiences and the impact they have on students in the environmental education (Jensen & Schnack, 2006).

Actual experiences are an integral part of environmental education. According to Layrargues (2000), for environmental education to be effective, it should be centered on local environmental concerns. He reiterated that enlightening the people on local problems experienced in daily life should take priority in environmental education. This is more likely to elicit positive response geared towards solving local environmental problems that the student encounters on a daily basis.

According to Venkataraman (2008), a model curriculum on environmental education should adopt a "hands-on" approach for it to effectively address practical problem solving. This necessitates incorporation of in-and-out- of- class activities. In addition, environmental education should inspire personal responsibility which in turn calls for emphasis on the consequences of human consumption patterns. Environmental education is multifaceted and multidisciplinary. Consequently, it must take into account the culture of the locality, diversity, ethics and justice for it to move people to action.

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

Research has revealed that acquisition of more knowledge and increase in awareness does not necessarily elicit pro-environmental behavior which Kollmuss and Agyeman (2002) defined as: "behavior that consciously seeks to minimize the negative impact of one's action on the natural and built world" (p.240). Only minimal pro-environmental behavior can be attributed to environmental knowledge and awareness.

Kollmuss and Agyeman (2002) were of the opinion that environmental education should be-action oriented. This would enable educators to teach pro-environmental behavior by engaging students in activities that allow them to put it into practice in the natural environment. With time of doing this repeatedly, it becomes a habit.

Media education incorporated in environmental education in schools can be instrumental. Tilbury (1995) considered media, both visual and written a potent means for environmental education that could be used to heighten awareness and enlighten the masses on the effects of their actions on the environment as well as to teach them how to conserve it. Additionally, it can enlighten the public on the effects of environmental issues and political decisions on the production, distribution and use of resources. The importance of critical thinking skills, reflection, democratic values and acquisition of knowledge of human impact on ecology and ecological problems cannot be overemphasized (Emmons, 1997; Jensen & Schnack, 2006; Tilbury, 1995).

The practical aspect of environmental education received backing from Carrier (2009). According to a research she carried out, elementary students develop a more profound comprehension that eventually elicits environmental action through lessons that take place outside the classroom. Her research involved drawing comparisons between activities conducted in the schoolyard and those conducted in the traditional classroom to determine the impact of environmental education lessons on elementary students. In her findings, she established that students' learning can be enhanced by incorporating active learning environments in the school science curriculum. Accordingly, she proposed direct contact with nature for environmental action.

Other proponents of practical experience in environmental education were Riordan and Klein (2010). According to them, taking students on learning expeditions, involving them in active investigations and in solving issues relevant to their locality would rouse their curiosity and evoke passion for environmental issues. Further, they were of the opinion that environmental action is influenced by teacher education, teaching and learning activities and the location (Riordan & Klein, 2010).

While many in the field of environmental education advocated for practical experience, Short (2009) suggested that developing critical thinking skills should be the focus of educators if they are to increase environmental awareness. This he said, would minimize the quest for raising awareness thereby creating more time for higher order thinking skills, research based, and action based activities. Short's emphasis was therefore on critical thinking activities for students' action and participation (Short, 2009).

A profound understanding of the environment by a student can be enhanced by building on his own existing knowledge. This is in accordance with the constructivist theory on which M. J. Stern, Powell, and Ardoin (2010) thought environmental education should be drawn. They argued that in a social learning environment, students discuss, generate and examine their own ideas and thereby, internalize the knowledge. This in turn leads to enhanced active participation in environmental matters. Approaching environmental education on the constructivist theory they said, would engage students in learning about environmental issues generally using cooperative or collaborative strategies (M. J. Stern et al., 2010).

After conducting a research in Kenya, Mutisya and Barker (2011), they recommended that while the theoretical teaching aspect accompanied with techniques that motivate active teaching and learning is important, the practical sessions in the environment in which students are engaged in providing solutions to environmental issues are also vital. This, they said, would give them an opportunity to create and examine their own solutions. This recommendation followed the revelation that primary students in Kenya lacked knowledge on management of environmental issues even though they were well versed on their effects.

A mail survey on how environmental education is conducted in the classroom was carried out in the year 2000 by the Research Center of University of Maryland, USA. This survey which was sponsored by the North American Association for Environmental Education (NAAEE) and the Environmental Literacy Council (ELC) revealed that only 61.2% of teachers included environmental topics in their classrooms (ISTANBULLU, 2008). The specific percentages per grade level of teachers who included environmental topics were as follows:

Grade	Percentage of teachers
K-4	83%
5-8	58.7%
9-12	44.5%

Recycling and waste management was included by 90% of the teachers in their teaching programs with information drawn from textbooks, library and newspaper at 79.1%, 75.9% and 17.9% respectively. Text books were considered the most reliable source of information by 5th to 8th grade teachers with a percentage of 88.8 (ISTANBULLU, 2008). Teaching methodologies for environmental education were established to be as follows:

Discussion	90%
Hands on activities/projects	over 90% for K-4 teachers
Problem solving	55%-61% for all grades

Field trips on the other hand, were found to be a less preferred teaching method among grade 9-12 teachers. The conclusion of the survey was to a certain degree, environmental education was offered and as opposed to creating a specific course, it was achieved through integration of the topics into other courses (ISTANBULLU, 2008).

A study conducted on Mexican and English students aged 7 to 9 years by Barraza and Cuarón (2004) came to the conclusion that schools had power to enhance students' knowledge and awareness of the environment. Development of environmental policies to this effect would therefore be advantageous. The study had sought to establish students' familiarity with ten selected environmental terms included in their curriculum and if they knew the meanings of these terms. These terms were habitat, pollution, recycling, global warming, deforestation, solar energy, endangered species, extinction, nuclear power station and ozone layer. Results emerging showed that 7.2 terms out of 10 had been heard while 5.8 terms were known in average (Barraza & Cuarón, 2004).

Another study conducted by Shepardson (2005) to find out the effects of grade level and educational experience on students' perception of environmental issues revealed that students viewed the environment from a limited perspective such as a location for animals. Majority of them were ignorant of the aspect of human management of the environment and did not regard humans as part of the environment. The research was based on 81 students in 7th, 8th and 9th grade from general biology and 9th grade students in college preparatory. The students were drawn from rural and agricultural communities. The study involved two environmental tasks which were, drawing a picture and explaining it and studying a given photo and explaining if it portrayed an environment.

DeChano (2006) conducted another environmental study on students ranging from ages 17 to 19 across Chile, England, Switzelrand and USA. He tested the hypothesis that the more knowledge an individual had on the environment, the more he developed a positive attitude towards it. Literature pertaining to this study was composed of 3 sections as follows:

- Demographic data
- Environmental knowledge questions which were presented in 4 parts namely; human activity, atmosphere, biodiversity, ecosystem and water.
- Attitude measurement questions

This study did not establish any predominant patterns on the relationship between environmental knowledge and attitude. Chile, which does not have compulsory environmental education but rather incorporates environmental concepts and concerns into subjects like chemistry, biology and geography, was found to have the lowest score out of the four countries studied. Switzerland on the other hand scored the highest (DeChano, 2006).

In 2005, another study seeking to establish the state of environmental education in primary schools in Greece was conducted by Chatzifotiou (2005). Primary school teachers from three regions participated in the study. The study deduced that in Greek, the National Curriculum spearheads environmental education in schools and the corresponding activities had a significant positive impact on the teachers' environmental awareness. The researchers established that there were three aspects of environmental education in Greece. These were; environmental education related to climate, water, plants, animals etc, environmental education that is concerned with students' perception of the environment as a centre of investigation and environmental education that dealt with instilling positive attitudes and behaviors towards the environment (Chatzifotiou, 2005).

A study based on the empirical, exploratory and descriptive designs was conducted by Said, Yahaya, and Ahmadun (2007). 307 students selected at random from four secondary schools in Johor Malesia participated in this study which aimed at approximating the levels of environmental comprehension, consciousness and knowledge. To this effect, the students were also subjected to exercises that pertained to sustainable consumption. The outcome showed that the participants were well versed on environmental issues. However, the increase in environmental awareness owing to environmental education had no impact on their behavior (Said et al., 2007).

According to a study done by Ravindranath (2007), environmental education in teacher education profoundly impacts the strategies and practices relevant to sustainable development as it enhances environmental literacy. Ravindranath's study sought to establish the significance of environmental education and the challenges in the bid to attain the sustainable development goals put forward by the UN Decade of Education for Sustainable Development.

2.3 Environmental Literacy

2.3.1 Environmental Literacy Definition

The ability to write, read and comprehend information defines literacy. Literacy is further defined as the reader's ability to apply the information, analyze, reason and communicate effectively in diverse circumstances as they present, solve and interpret issues (OECD, 2010).

A person is considered to be environmentally literate when he gets to a position where he is able to make informed decisions relating to the environment and is eager to act accordingly either on his own or in a group for the purpose of improving the livelihood of other people, societies and generally the global environment. This person is also an active participant of civic life (Hollweg et al., 2011). Though in varying degrees, environmentally literate people are characterized by the following:

- Knowledge and understanding of a wide range of environmental concepts, problems, and issues;
- A set of cognitive and affective dispositions;
- A set of cognitive skills and abilities; and
- Appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental contexts (Hollweg et al., 2011: 2-3).

It is apparent in the professional EE literature that the major outcome of EE is perceived as development of "environmentally literate citizenry". This outcome is either explicitly or implicitly observed in published definitions and frameworks (Brennan, 1994; J. F. Disinger & C. E. Roth, 1992; ERDOĞAN, 2009; Roth, 1992; Schneider, 1997), sets of goals and objectives, reviews of the professional literature, and collections and reviews of research (ERDOĞAN, 2009).

In one of the earlier efforts to understand environmental education and define environmental literacy, Harvey (1977) expressed that an environmentally literate person is "one who possesses basic skills, understandings, and feelings for the man-environment relationship".

In the ensuing years, other definitions came up. The Tbilisi Document stated that an environmentally literate person has: "

- An awareness and sensitivity to the total environment
- A variety of experience in and a basic understanding environmentally associated problems
- Acquired a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection
- Acquired the skills for identifying and solving environmental problems
- Opportunities to be actively at all levels in working toward resolution of environmental problems" (Jeske, 1978: 26-27).

J. F. Disinger and C. E. Roth (1992) on the other hand, perceived environmental literacy as the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems.

The Environmental Literacy Committee operationally defined EL as;

> (i) basic scientific principles that govern natural systems, using these to understand the limits and major factors associated with the earth's capacity to sustain life
> (ii) linkages among all living things and their dependency on each other as well as the physical environment
> (iii) consequences of human activation local, regional, and global natural systems
> (iv) impact of changes within natural systems of life, health, and welfare
> (v) cultural, economical, and political forces-both past and present- that affect environmental attitudes and decision making
> (vi) role of ethics and morality in individual and growth decision making related to the environment" (Moody, Alkaff, Garrison, & Golley, 2005: 5).

Roth (1992) classified environmental literacy into three levels namely; nominal, functional and operational.

> "**Nominal EL:** indicates a person able to recognize many of the basic terms used in communicating about the environment and able to provide rough, working basic definitions of their meanings. Individuals at this level are aware of environmental issues, sensitive to environment, have positive environmental attitude, and feel concern for the environmental problems.
> **Functional EL:** indicates a person with a broader knowledge and understanding of the nature with its interactions between other systems. Individuals at this level are aware and concerned about the negative relationships among the systems and they can analyze, synthesize, and evaluate information on environmental issues.
> **Operational EL:** indicates a person who has moved beyond functional literacy in understandings and skills. Those individuals evaluate the consequences of actions; synthesize information, choose among alternatives, and advocate and take actions for a healthy environment. Those people are likely to be acting at several levels from local to global in so doing" (Roth, 1992: 26).

In their definition of environmental literacy, (J. F. Disinger & C. E. Roth, 1992) considered environmental sensitivity, knowledge, skills, attitudes and values, personal investment and responsibility, and active involvement. In 1992, Roth reorganized these aspects of environmental education into four categories as follows: "

(i) Knowledge
(ii) Skills,
(iii) Effect which touched on sensitivity, attitudes and values
(iv) Behavior which included personal investment, responsibility and active involvement".

Moseley (2000) argued that a person's environmental awareness cannot be equated to environmental literacy. He went on to state that a person with a broad understanding of the environment and who shows concern or acts on isolated environmental issues cannot also be described as environmentally literate. Morrone, Mancl, and Carr (2001) describe environmental literacy as modification of values, attitudes and skills into action. Values and attitudes partly form ecological psychology while ecological knowledge is found in environmental education. Clair (2003) stated that environmental literacy is knowledge that is blended with action.

Environmental knowledge in isolation does not constitute environmental literacy. As Morrone et al. (2001) stated, it should include values, attitudes, skills and action. In agreement with them were Goldman, Yavetz, and Pe'er (2006): 5 who described an environmentally literate person as one who "possesses values, attitudes and skills that enable knowledge to be converted into action".

Environmental literacy is about awareness, sensitivity, respectful attitude and concern for environment coupled with possession of various skills to evaluate environmental problems. In addition, this should be complemented with active involvement either individually or cooperatively at all levels to provide remedies or solutions to environmental problems. This is as put forward by T. Marcinkowski (1991).

An understanding of the environment that allows the individual to positively contribute their acquired information to cater for their needs and by extension the society, in a more sustainable way should be the focus of environmental literacy. Environmental literacy enhances choices, learning and ultimately the choices that people make. It is a call to study and comprehend environments concerns at length (Gayford, 2002).

Environmental literacy:

> "•has a significant scientific component, since most environmental problems require this dimension in order that citizens can fully appreciate the issue. It should help to

• encourage an understanding of interactions between human populations and natural resource systems;
• requires understanding which is organized according to major unifying principles;
• enables students to appreciate the difference between opinion and scientific information based on evidence;
• involves the development of the ability to discover new knowledge and the ability to use available knowledge to solve problems;
• concerns the development of attitudes, approaches, ethics, skills and related knowledge and concepts which are necessary to cope with a rapidly changing environment and which are useful in problem solving and decision making in daily life;
• is an aspect of education for all" (Gayford, 2002: 106).

A significant number of studies affirm that environmental quality which is influenced by human life can be realized by raising the standard of environmental literacy. As far as enhancing the quality of environment is concerned, environmental literacy should be the main focus of education at all levels.

2.3.2 The Domain of Environmental Literacy

Knowledge and comprehension of diverse environmental concepts, concerns, a set of cognitive and affective dispositions, cognitive skills and abilities constitute environmental literacy. Additionally, environmental literacy involves appropriate response in different environmental contexts based on an understanding of information acquired. This perception of environmental literacy aligns with environmental education writings that view environmental literacy as composed of four interrelated components which are knowledge, dispositions, competencies, and environmentally responsible behavior (Hollweg et al., 2011).

2.3.2.1 Knowledge

The National Environmental Education and Training Foundation & Roper Starch Worldwide, 2005, defined environmental knowledge as the identification of key environmental principles, their associated problems and exhibiting comprehension of their causes and solutions (Coyle, 2005).

In addressing environmental knowledge, J. A. Palmer (1998) was of the opinion that acquisition of pertinent knowledge and comprehension of concepts pertaining to the environment to enhance critical judgment by students should be emphasized. In addition, environmental skills, knowledge, appropriate attitudes and environmental awareness can be developed more through experiences in the environment.

Scientific knowledge of the natural and built environment with the associated issues is difficult to understand in its entirety more so for young people and even adults (Brandon & Lombardi, 2010). However, some knowledge of the earth's system as well as physical and ecological systems is crucial to environmental literacy. Of importance also on environmental matters are the impacts of social, political, economic and cultural influences and the intricacies of these interacting systems. Basic knowledge and understanding of issues such as population growth, use of natural and energy resources, land use, loss of biodiversity, and ecosystem deterioration at local, regional, and global levels are also needed (Harris, 2000).

According to research findings in different countries, teachers' attitude, confidence and willingness to implement environmental education in class influence environmental knowledge. In teaching environmental principles, teachers with a negative attitude towards the environment exhibit less confidence when teaching environmental concept (Skanavis, 2001). Teachers with training in environmental education, exhibit a positive attitude towards teaching and even integration of environmental education in the curriculum as opposed to those who don't. This can be attributed to their better understanding of environmental concepts (Cotton, 2006).

Adept response to an environmental condition or problem is based on the five types of knowledge that make up environmental literacy (Hollweg et al., 2011: 3-3). These are: "

- Physical and ecological systems
- Social, cultural, and political systems
- Environmental issues
- Multiple solutions to environmental issues
- Citizen participation and action strategies"

Since the late 1960s and 1970s, the aforementioned areas of knowledge have been acknowledged by literature on environmental education such as Hart (1981); Harvey (1977); Schmieder (1977); Schoenfeld (1969); and Stapp (1969). Programs and state environmental education frameworks have incorporated the first three of the aforementioned knowledge components (Simmons, 1995). These three are also found in environmental literacy frameworks like H. R. Hungerford and Volk (1990); Roth (1992); and Simmons (1995).

Knowledge of physical and ecological systems: The ecological and physical systems are vital to environmental literacy. Over the years, the science on earth systems has grown with pertinent concepts emerging as: interdependent relationships in ecosystems; cycles of matter and energy transfer in ecosystems; interaction among Earth's major systems; the roles of water in Earth's surface processes; climate change and how the effects of human activities on Earth's climate are modeled; and conservation of energy and energy transfer (e.g., Cherrett and Bradshaw (1989); R. L. Smith, Smith, Hickman, and Hickman (2006); Munson (1994); de Jonge (2007); and Orians (1990)).

Knowledge of social, cultural, and political systems: Diverse social, cultural and political systems e.g. kinship, agricultural, transportation, economic, and legal systems must of necessity be understood when it comes to actual environmental issues.

Of importance also is the historical and geographic contexts in which they have developed and now function (Bossel, 1999).

Knowledge of environmental issues: In environmental literacy, acknowledgement of factors that negatively impact the natural systems and the resulting effects is crucial. Both the biophysical and human causes must be considered. For this reason, this category is further divided into two:

- Knowledge of a variety of environmental problems that arise from biophysical impacts apparent in the natural world,
- Knowledge of environmental issues that arise from human conflicts about environmental problems and solutions (Hollweg et al., 2011).

Knowledge of multiple solutions to environmental issues: This category is proof of the importance attached to problem solving in environmental education. It is characterized by knowledge of past, ongoing, and current efforts, as well as of proposed and future alternatives, aimed at helping to solve environmental problems. To give students a historical perspective, motivate them to study the effects of various problem-solving strategies and to avoid pessimism in students, texts and courses on environmental studies often discuss problem-solving efforts (Firestone & McElroy, 2003).

Knowledge of citizen participation and action strategies: Interaction with the environment by individuals or a group of people occurs in the following ways (Hollweg et al., 2011):

- Positively i.e. by taking action to help improve or maintain the environment
- Negatively i.e. by acting in ways that decrease the quality of the environment
- Passively i.e. by neither harming nor helping the environment

- In a mixed manner.

2.3.2.2 Dispositions

The inclusion of learners' dispositions as part of the objectives for environmental education in renown documents such as Harold Hungerford et al. (1980) ; NAAEE (2004); T. D. UNESCO (1978); and UNESCO (1977) attests to their importance. Dispositions have also formed part of the objectives in program and state environmental education frameworks (Simmons, 1995) and in environmental literacy frameworks like H. R. Hungerford and Volk (1990); Roth (1992); and Simmons (1995). People's behaviors towards the environment, be they positive or negative, are determined by dispositions. Students' compliance to value perspectives and enthusiastic contribution to public discussions on environmental issues is influenced by their dispositions towards the environment.

Sensitivity towards the environment is influenced by formative life experiences (Chawla & Cushing, 2007; Sward & Marcinkowski, 2005). Sensitivity in this context can be described as "a set of positive affective characteristics that result in an individual viewing the environment from an empathetic perspective" (Peterson, 1982). Studies have proven that there is a significant correlation between an individual's life experiences and his sensitivity towards the environment (Arbuthnot, 1977; McKenzie-Mohr, Nemiroff, Beers, & Desmarais, 1995; Tarrant & Cordell, 1997).

The general feelings towards ecology and the environment, and the concern for specific environmental issues coupled with the conviction to act accordingly to solve environmental problems can be referred to as environmental attitude (Pe'er, Goldman, & Yavetz, 2007). DeChano (2006), defined environmental attitude as the predispositions that influence someone's perception and interpretation of the physical, social, and cultural conditions that affect the development of organism. Environmental attitude has also been referred to as a of values and beliefs that influence a person's feelings to act either positively or negatively towards some particular aspects of the environment (Hines et al., 1987).

The 1970s witnessed the commencement of studies on environmental attitudes and currently it is a clearly defined field (Fernández-Manzanal, Rodríguez-Barreiro, & Carrasquer, 2007). During this period, there was a refinement of the goals of environmental education to effect emphasis on attitudes, values, decision-making skills and action components (A. Gough, 2002). McGuire (1986) stated that "Attitude has been the dominant social psychology concept….exercising hegemony over the discipline's imagination for more accrued time than any other concept" (McGuire, 1986: 89).

In concurrence with Guire's definition, Fernández-Manzanal et al. (2007) stated that, "Environmental attitudes provide a good understanding of the set of beliefs, interests or rules that influence environmentalism or pro-environmental action" (Fernández-Manzanal et al., 2007: 990). Ajzen (2001), on the other hand, stated that "There is a general agreement that attitude represents a summary evaluation of psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant, and likable-dislikable" (Ajzen, 2001: 28).

The understanding and awareness of environmental matters by the society must be elevated for people to recognize the complexity of environmental problems given the fact that they are global, uncertain in origin, scattered across the world and with uncertain effects. For this reason, researchers began to consider public opinion on environmental problems. Special attention was given to the attitude aspect (Dunlap, Liere, Mertig, & Jones, 2000).

As students engaged in environmental education grow, they begin to assume responsibility for personal and collective contributions in a bid to reduce and solve current problems in an appropriate manner. Personal responsibility refers an individual's personal commitment to environmentally corrective behaviors (Borden, 1984). According to research, it includes dispositions associated with meta-cognitive processes that lead individuals to avoid or reduce behaviors that contribute significantly to negative environmental impacts, as well as undertake behaviors that contribute significantly to positive environmental impacts (Bamberg & Möser, 2007).

In all matters, the environment inclusive, people expect positive reinforcement from the outcome of their actions. The degree to which people expect to be reinforced is referred to as "locus of control" (Peyton & Miller, 1980). Early ideas of distinguishing internal and external locus were refined through theory and research (Levenson, 1972). This was achieved through making distinctions between *powerful others* and *chance* as dimensions of an external locus of control and between individuals *acting alone* and *acting as member of a group* as dimensions of an internal locus of control (Hines et al., 1987; T. Marcinkowski, 1991; Smith-Sebasto, 1992). When complemented with skills and incentives, this disposition determines the type and level of effort people make to achieve a goal. It is also predictive. In circumstances where people are not certain of making a difference, they are less likely to act. They are also less likely to engage in a task which they do not believe they can do well (Bandura, 1997; T. Marcinkowski, 1991; Peyton & Miller, 1980).

A person's ability to initiate a task and succeed at it is influenced by self-efficacy. Bandura (1986) defined self-efficacy as people's opinion about their ability to manage activities necessary to perform at a certain level, and their ability to carry out these activities successfully. In the education sector, self-efficacy is fundamental to teaching. The performance of students and teachers alike is dependent on it. More effort and enthusiasm in teaching is exhibited by teachers with high standards of self-efficacy. These teachers are also able to effectively adopt suitable teaching and learning techniques (Cho & Shim, 2013). High academic performance is realized from learners under teachers with high efficacy as opposed to dismal performance from learners under teachers with low self-efficacy levels (Cerit, 2011; Chambers & Hardy, 2005). The Self-efficacy theory envisages diligence and persistence from teachers with high self-efficacy even when faced with challenging circumstances in the classroom owing to the fact that they are confident about their own abilities to succeed and even the students' (Erdem & Demirel, 2007). These teachers are also able to motivate students' participation by spending more time keeping track of them, supervising their works during a lesson, and providing them with group works and collaborative tasks (Al-Alwan, 2014; Good & Brophy, 2005; Woolfolk Hoy & Davis, 2006).

2.3.2.3 Competencies

Detection of environmental issues requires an aptitude for receiving sensory input and interpreting it based on past knowledge and experience. This calls for competencies. These are a combination of skills that may be required in utilized in actual situations and assessment settings for a given purpose. Competency may require recognition and employment of suitable media sources, ability to distinguish between features of environmental problems and issues in those sources, ability to review the authenticity of information, and recognize significant viewpoints in those sources and determine the status and relevance of that issue (Hollweg et al., 2011).

In environmental education, competencies have been incorporated in major sets of goals and objective e.g. in Harold Hungerford et al. (1980); NAAEE (2004) and UNESCO (1977). In program and state environmental education frameworks

(Simmons, 1995) competencies serve to:

- Identify environmental issues
- Analyze environmental issues
- Use evidence and knowledge to describe and support a position
- Create and evaluate plans to resolve environmental issues.

Studies of the development and application of many of the skills and abilities that comprise these competencies have been included in the analysis of environmental education research (Coyle, 2005; Hines et al., 1987; T. J. Marcinkowski, 2004; Rickinson, 2001).

Students, among others, should exhibit competence in explaining and substantiating environmental conditions, risks and impacts. In addition, they should identify human conflicts central to the environmental issues. This includes the historical and geographic aspects of these issues, the contributing factors and the ecological, economic, social and political implications (Scholz & Binder, 2011).

Identification of environmental issues ultimately leads to queries relevant to the problems. The arising questions may pertain to the human dimensions, historical or geographic features or other aspects of an issue and they may serve as pointers to the need for factual, conceptual, or procedural information. Additionally, they reflect different levels of Bloom’s Taxonomy (Bloom, 1974; Krathwohl, 2002). Of utter most importance is that this competency enhances an individual or groups potential to ask higher order questions that lead to discovery of conditions that resulted in or contributed to an environmental problem at hand, the implications of the problem and the appropriate action to take.

The analysis of an environmental problem requires an understanding of the scientific knowledge and new information related to it. Further, it requires potential to establish factors that contributed to the issue in question, the relation between features of the problem and the issue and to determine its implications (Raymond et al., 2010).

The aforementioned competencies are paramount to investigation of environmental issues. Investigation of issues may involve location and collection of information from pertinent sources such as libraries, internet, interviews with knowledgeable sources and stakeholders etc. The information acquired should of necessity be reviewed to be clear of factual inaccuracies or bias before it is compiled and presented as a written report or oral report (Hollweg et al., 2011).

2.3.2.4 Environmentally Responsible Behavior

Instilling environmentally responsible behaviors (ERB) and raising environmentally responsible and active citizens is the ultimate goal of environmental education. (De Young, 2000; H. R. Hungerford & Volk, 1990; McKechnie, 1977; McKenzie-Mohr et al., 1995; Mobley, Vagias, & DeWard, 2009; Stapp, 1969). Discussion in the Tbilisi conference (T. D. UNESCO, 1978) gave emphasis to changes in behaviors as a goal in Environmental Education. In concurrence with the proposed objectives at the Tbilisi Conference, H. R. Hungerford and Volk (1990): 9 defined environmentally responsible citizens as the ones who have:

> "(1) an awareness and sensitivity to the total environment and its allied problems [and/or issues], (2) a basic understanding of the environment and its allied problems [and/or issues], (3) feeling of concern for the environment and motivation for actively participating in environmental improvement and protection, (4) skills for identifying and solving environmental problems [and/or issues], and (5) active involvement at all levels in working toward resolution of environmental problems [and/or issues]".

In the field of environmental education and associated acts, environmentally responsible behavior has been referred to in a variety of terms that include, environmental behavior, pro-environmental behavior and ecological behavior (Bamberg

& Möser, 2007). These references are used to indicate behavior geared towards a positive impact on the environment through targeting problems and issues (Cook & Berrenberg, 1981; T. J. Marcinkowski, 1988; P. Stern, 2000). The utilization of knowledge, dispositions and competencies within a context, essentially describes environmentally responsible behavior.

Diverse perceptions, some of which are not exclusive to the environmental field, have characterized the concept of environmentally responsible behaviors. In one approach, focus is on the nature of individual and collective responses to conditions in ways that are: proactive (e.g., citizen action); interactive (e.g., citizen participation and community service); or reactive (e.g., coping and compliance behavior) (Hollweg et al., 2011).

Another approach on environmentally responsible behaviors centers on a developmental continuum that progresses from intention to habit (E. R. Smith & DeCoster, 2000). The process that ultimately leads to intentional behavior was described as rule-based by E. R. Smith and DeCoster (2000). Experiences in processes that are rule-based are the basis for further processing and, arising situations are processed within the existing context. Intentional behaviors, with time of practice, become habits e.g. turning out the lights when leaving a room. A third approach incorporating elements of the two aforementioned approaches was developed. It is practiced in social studies education as a resource of citizenship education (Langton, 1990).

Taking charge of environmental issues with the intention of resolving them is a show of environmental literacy. This however, requires a profound comprehension of the science and structural interactions that influence environmental issues. Of importance also is the possession of cognitive abilities and affective dispositions. These empower an individual to have an edge of finer contemplation on the issues at hand and take action.

In addressing environmental literacy, considerations must be taken on the context within which it is expressed (P. Stern, 2000). These include:

- The personal context
- The social context
- The physical context

2.3.2.4.1 Personal Context

Gender

A study conducted by Tikka, Kuitunen, and Tynys (2000) on the effect of gender on environmental literacy established that female students possessed more attitudes towards nature and the environment than male students. The study involved 464 students who had graduated from a comprehensive school in central Finland.

Another study conducted by Yilmaz, Boone, and Andersen (2004) to probe the effect of gender on environmental issues showed that elementary and middle school Turkish female students exhibited more support for environmental issues than their male counterparts. Similar results were established by VARIŞLI (2009) when he conducted a study on environmental literacy of eighth grade public school students. Other researchers have also drawn the conclusion that environmental literacy is significantly affected by gender. Females generally exhibit higher levels of environmental literacy than male more so with regard to attitude, use, and concern components. However, males are more action-oriented in environmental matters than females and even perform better in tests on environmental knowledge.

Background

The effects of Individuals' professional backgrounds, such as teaching experience, study of environment related courses or failure to take one and fields of education, significantly determine environmental literacy. According to a study done by Mosothwane (1991), experience had a major effect on content knowledge. The study had assessed pre-service teachers' environmental literacy.

Vast teaching experience plays a big role in environmental sensitivity, awareness and values and environmental behaviors. However it does not do much for environmental knowledge and total environmental literacy. This is in accordance with a study on environmental literacy taken by (Owens, 2000). The study featured 292 middle school teachers.

Education is perceived as a crucial way to enhance environmental literacy and fulfill the societies' quest for environmentally literate and responsible citizens in future. This has led to the development of environment related programs and courses for schools. Pande (2001) designed an environmental education course in rural schools with the intention of introducing environmental and livelihood issues into mainstream curriculum. Results established that a separate course on environmental education is practical and did not, as would be expected, require instructors with a science background to be effective.

Another important aspect in environmental literacy is the source from which environmental knowledge is drawn. Barraza and Cuarón (2004), conducted a study on students knowledge of the concepts of habitat, pollution, recycling, global warming, extinction, solar energy, endangered species, deforestation, nuclear power station, and ozone layer and the source of their information. The findings revealed the most popular sources to be school, television and parents. In 2009, Erdoğan also probed students' source of environmental knowledge and listed his findings as school, family, internet, television, books, magazines and encyclopedias (ERDOĞAN, 2009). In 2009, Varışlı had a similar research on grade 8 students in public schools and the results established television, school and journals as the main sources of information. With school and media being the major sources of information, special attention should be given to them in order to draw the benefit of developing environmentally literate citizens (VARIŞLI, 2009).

In conclusion, although several researches have indicated the effect of environmental related courses on environmental literacy, many others established no relationship between the two.

Age

The findings of a study on the effects of age on environmental education conducted by Tikka et al. (2000), indicated that the older the students, the more active and aware on biological and environmental facts they are. This study was carried out on students from Finland.

No particular patterns have emerged from research on the effect of age difference and environmental literacy. Some studies indicated a higher level of environmental literacy among younger participants while others indicate the opposite. More studies need to be carried out to establish the effect of age on environmental literacy.

Socio-Economic Status

Researchers in the environmental education field have carried out studies to determine if there were any differences on environmental literacy between individuals from diverse socio-economic statuses.

A study conducted by Yilmaz et al. (2004) on students in grade 4 to grade 8 established that students from families with high income exhibited more positive attitudes towards environmental issues. In addition to socio economic status, the study sought to identify the strength of Turkish students' views with regard to environmental issues presented in the national curriculum and to determine how these views differ by several demographic characteristics.

Apart from a few exceptions (ERDOĞAN, 2009), studies conducted in this area indicated that participants from middle or high socio-economic status have higher level of environmental literacy when compared with those from lower socio-economic status (Berger, 1997; Negev, Sagy, Garb, Salzberg, & Tal, 2008; Uzun & SAĞLAM, 2005).

2.3.2.4.2 Social Context

The expression of environmental literacy may be affected by societal influences and pressure owing to the fact that what is acceptable to one culture may not be acceptable to another (Biel, 2003; Derksen & Gartrell, 1993; Dietz, Stern, & Guagnano, 1998; Johnson, Bowker, & Cordell, 2004; Olli, Grendstad, & Wollebaek, 2001).

2.3.2.4.3 Physical Context

The effect of residential differences on environmental literacy has been researched on as it is viewed as a potential factor in environmental literacy. The region a participant's was raised in and his current residential area have been the focus of the researches.

The findings of a study on students from Finland by Tikka et al. (2000) showed that students from the metropolitan area in southern Finland which is the most densely populated, exhibited more positive attitudes. They attributed this to the fact that people in densely populated regions are more concerned about the state of the environment as opposed to students growing up in farms as they spend a great deal of their time on nature related activities.

A study of 138 sixth grade students by Tuncer, Sungur, Tekkaya and Ertepınar in 2004 found out that students residing in urban areas are more aware of the economical and academic aspects of the environmental problems and they were opposed to economic growth and industrialization. On the other hand, students from rural areas were uncertain (Tuncer, Sungur, Tekkaya, & Ertepinar, 2004).

Environmental issues do not occur in isolation nor do they emerge from nothing. They are a result of influences from physical, personal, social, and political contexts. These are not static but ever-changing scenarios and so, environmental literacy should also be dynamic (Hollweg et al., 2011).

2.3.3 Awareness in Environmental Literacy

Environmental competence, according to Steele (1980), is composed of *perceptual*, *cognitive*, *affective*, *behavioral*, and *personal* components. The potential to ascertain, prioritize, and screen relevant aspects of the environment in terms of their adaptive and aesthetic properties belongs to the perceptual component. The cognitive component on the other hand, deals with the processes of storing, organizing, and recalling salient and meaningful aspects concerning the environment.

The affective component has to do with both to positive and negative emotional responses towards the features of the environment. The behavioral element includes typical responses, coping strategies, and behaviors. These aspects are determined by an individual's character with regard to motivations, personality characteristics, expectations, cognitive styles, coping strategies. All these are constituent of the personal components (Steele, 1980).

Steele (1980) further stated that environmental competencies are in three kinds namely:

- Personal style, attitude, and awareness
- Environmental knowledge
- Practical environmental skills

Environmental sensitivity, knowledge, skills, attitudes and values, personal investment and responsibility, and active involvement are the factors from which environmental literacy is derived. These factors can be summarized into four categories namely, *knowledge*, *skills*, *affect,* and *behavior* (J. Disinger & C. Roth, 1992). According to Roth (1992), there are four stages in environmental literacy. These are:

- **Awareness**: This is the perception of human/nature interactions and consequences
- **Concern**: This is the perception of real or potential negative consequences of a set of human/nature interactions and the desire to effect change
- **Understanding:** This is the acquisition of information on the present and future implications and consequences of current human/nature interactions
- **Action:** This is the application of knowledge on individual and corporate behavioral changes in order to modify human/nature interactions

In 1999, Pedersen categorized environmental competencies in the following way:

- Conscientiousness,
- Environmental knowledge,
- Practical skills, and
- Resource conservation (Pedersen, 1999).

Factors influencing environmental behavior were put into three categories by Hwang, Kim, and Jeng (2000) as follows:

- Cognitive: This pertains to a person's level of awareness and knowledge of the environment
- Affective: This pertains to emotions and feelings associated with environmental issues
- Situational factors: This pertain to an individual's or group's situation, and include economic, demographic, and cultural constraints that may inhibit environmental behaviors.

Studies conducted by Endsley and Robertson (2000) indicate that situation awareness is integral to the wide variety of complex systems and in taking actions on environmental problems. This verifies the existence of a connection between awareness and the action domain. It further verifies that in highlighting the components of environmental literacy, the place of knowledge in determining environmental awareness is over-emphasized. The supposition that awareness is merely a knowledge related concept characterized earlier discussions on developing students' positive environmental behavior (Endsley & Robertson, 2000).

Environmental knowledge, according to Kaiser and Fuhrer (2003), influences people's attitudes towards environmental behaviors and their intentions to take action. They further classified it into:

Declarative knowledge: This concerns environmental system and how it works;

Procedural (action-related) knowledge: This pertains to conservation goals and how to achieve them;

Social knowledge: This relates to human behavior; and

Effectiveness knowledge: It deals with the effectiveness diverse conservation behaviors (Kaiser & Fuhrer, 2003).

Awareness, in relation to environmental behaviors, was classified by (Tanner, 1999) as Personal awareness and General problem awareness. He defined personal awareness as a feeling of anxiety towards environmental problems due to a notion that they threaten personal health and well-being. General problem awareness on the other hand centers on the potential harmful outcomes for other people or the nature (Tanner, 1999).

As a factor influencing environmental behavior, awareness represents learned concepts and attentiveness to potentially harmful and not supporting their intentions. The notion that environmental awareness enhances relevant environmental behaviors has recently been rejected. This shows that knowledge per se (Glick, 2007), does not assure the learner's sustainable environmental behaviors (Cornelissen, Pandelaere, Warlop, & Dewitte, 2008; Hwang et al., 2000; Jensen, 2002; Vlek & Steg, 2007). Pruneau et al. (2006) and Jensen (2002) established that awareness of the problem, traditional environmental knowledge and constructive knowledge centered on action impact positive environmental behavior.

To accomplish environmental goals in learning situations, people depend on situation awareness, the gathering, incorporation, and utilization of environmental information which they combine with their unique knowledge and skills (Govern & Marsch, 2001).

With regard to situation awareness, Stanton, Chambers, and Piggott (2001) proposed three theoretical perspectives which are the information-processing approach, the activity approach, and the ecological approach. They went on to state that obtaining situation awareness in the information processing approach requires sequential development of three levels of awareness namely, perception, comprehension and projection in the respective order.

In the activity approach to situation awareness, the degree of an individual's conceptualization of the situation depends on the nature of the task and goals. This then forms the basis on which new information is perceived and interpreted (Bedny & Meister, 1999).

K. Smith and Hancock (1995), developed an ecological approach to the situation awareness which suggested that awareness materializes from the interaction of an individual with the world.

A shift from the current focus of knowledge-centered education in environmental education to action centered teaching methods can be affected through integration of dynamic action-related awareness into the theoretical models of environmental literacy development.

2.3.4 Research on Environmental Literacy

A research conducted on 464 students by Tikka et al. (2000) revealed that biology students had the most positive attitudes towards nature and the environment and possessed the greatest level of knowledge. They were also actively involved in many nature-related activities. On the contrary, the attitude of students pursuing economy and technology towards the environment was more negative. Their engagement in environment related activities was also less than other students in general. The study was carried out to probe differences in attitudes towards nature and the environment in various educational institutions. Additionally, it sought to find out more about their engagement in environment-related activities and knowledge.

The environmental attitude of students from rural and urban areas was a subject of study by (Tuncer et al., 2004). It involved sixth grade students in Ankara. The research established that students from urban areas had a greater awareness of environmental problems, individual responsibilities and national environmental problems than those from rural areas. However, all the students were in agreement on self responsibility.

Shepardson (2005) conducted a study on the concept of environment. It featured 81 students from seventh, eighth and ninth grade. The students were asked to define the concept of environment by drawing pictures. It was discovered that students conceptualize environment from a limited ecological perspective. To them, it is a location where animals live. Humans were not an aspect in their definition. The students displayed a nominal level of environmental literacy which is a far cry from functional and operational literacy.

Tuncer, Ertepinar, Tekkaya, and Sungur (2005) researched on secondary and high school students' environmental concern. The participants were 1497 students in grades six to ten from ten schools located in Ankara. According to research findings, students are concerned about environmental problems, see the need to conserve resources for future generations and believe in personal responsibility to protect the environment. They do not view pollution as a temporary problem and they identify the relationship between economic growth, industrialization and environmental concerns.

Another study evaluated environmental knowledge and attitudes among students in 6th, 8th and 10th grade in Turkey. The study was performed by Tuncer, Tekkaya, and Sungur (2006) and involved 1,977 students who completed the Children's Environmental Attitudes and Knowledge Scale. It considered the effect of gender and grade level of students and probed the relationship between environmentally responsible behavior and environmental knowledge, affects, behavioral intentions and demographic variables. The results showed that grade level has a profound effect on environmental knowledge. The study concurred with many others on the fact that females exhibited a more positive attitude towards the environment and that environmental knowledge was not affected by gender.

An investigation of environmental knowledge and attitudes among elementary school students was done by Elvan Alp, Ertepinar, Tekkaya, and Yilmaz (2008). Results showed that although the level of environmental knowledge was low, their attitude toward the environment was positive. Like many other studies, this research established that girls had a more favorable attitude towards the environment. It also established that their knowledge of environmental issues did not affect their behavior towards the environments.

Ökesli (2008), evaluated environmental literacy level in terms of knowledge, attitude, use, and concern components among sixth, seventh and eighth grades of primary school students in Turkey. Results emerging from the study showed that the students were aware of the importance of interaction between humans and the environment. It also emerged that in spite of the low levels of knowledge, the students had positive attitudes and concern toward the environment. The study also discovered that out of the components of environmental literacy in question, a strong relationship existed between 'attitude and use' and 'use and concern'. It was also proved that students, who exhibited a higher level of environmental literacy than others, had environmentally literate parents. Female students were found to be more positive in terms of attitude towards the environment, views on environmental use and concern about environmental problems than male students.

In a bid to understand primary school teachers' perceptions of biodiversity, carbon cycle, ozone and global warming, Summers, Kruger, Childs, and Mant (2000) interviewed twelve practicing teachers. The findings of the study showed that their awareness of the loss of diversity and of the evolutionary mechanism by which it enables adaptation and survival of species was poor. The participants had the misconception that "holes" cause global warming and that the ozone-destroying chemicals come from car exhausts. Knowledge of man's enhancement of the natural greenhouse effect and the earth as a system that receives and radiates the sun's energy was also lacking.

Owens (2000) worked with urban middle school teachers to establish environmental literacy levels among teachers. A total of 292 teachers were investigated. In the study, teachers scored highest on affective subscale but behavioral subscale scores were the lowest. Owens noted a disconnection in translating environmental concern into positive environmental behavior. However, the participants generally believe problems can be solved and with this regard, they have a personal responsibility to help.

A study on knowledge level conducted by Summers, Kruger, and Childs (2001) majorly focused on biodiversity, carbon cycle, ozone, and global warming. A total of 170 practicing primary school teachers, 120 primary trainees, 88 secondary science trainees participated in the study. The researchers discovered that the knowledge level was best in biodiversity and global warming.

Lower secondary school teachers in Australia were evaluated on their knowledge about environmental education by Cutter-Mackenzie and Smith (2003). Implementation of environmental education in lower secondary schools was found to be problematic and to have had limited success. The results of the study also revealed that lower secondary school teachers are likely to be functioning at a "knowledge" level of ecological illiteracy and/or nominal ecological literacy. Limited and little understanding of environmental education was displayed. Misconceptions and simple understandings of various environmental concepts characterized the participants.

Bal (2004), conducted a study on the misconceptions of environmental concepts with special focus on the greenhouse effect. 140 pre-service teachers were evaluated and some misconceptions were apparent. For instance, they were of the impression that pollution increases the effect of greenhouse and this increases the number of poisoned people due to the food that they consume. Other misconceptions were on several greenhouse gases like CFC and methane.

In another study by Erol (2005) on 450 pre-service teachers, he discovered that pre-service primary school teachers are not interested in the environment and that they had misconceptions of concepts such as greenhouse effect, habitat, ecosystem and global warming.

Öztürk (2009) also studied 560 Pre-service teachers from a public university in Ankara on their environmental literacy through their epistemological beliefs. He found that environmental behaviors have positive relationships with environmental attitude, concern and knowledge and, that the relationship between behavior and knowledge was minimal. His conclusion was that increase in knowledge does not translate to increase in concern, attitude or behavior.

Women were found to possess stronger environmental attitudes and behavior and to have higher levels of socialization and social responsibility than men. This was in a literature review conducted by Zelezny, Chua, and Aldrich (2000) on difference in environmental attitudes and behavior.

In environmental literacy, the role of science education was viewed in the context of some skills such as knowing terminology, acquisition of new information and evaluation according to evidence, analysis and assimilation of information into existing information and synthesizing and judging. Methodologies used in science classes were concluded by teachers as using newspaper stories, presenting some contradictory ideas of scientists about environmental issues, role playing, using the web to find out different views and information, allowing students to express their ideas, use of pictures and story writing, critical evaluation of materials.

The effects of a course for developing and teaching environmental literacy at undergraduate level were investigated by Nair, Jones, and White (2002). Developing informed decision making skills for environmental issues was perceived as the aim of the course. Identification of fundamental knowledge areas was done at the initial stages of the study to environment understandable without disciplinary expertise. Application of knowledge was perceived as the ability of students to utilize a high level of skills such as analysis, synthesis and evaluation during decision making scenarios. Environmental literacy curriculum consisted of modules and each module was made up of topics with their respective resources and exercises. To enhance environmental decision making skills, there was inclusion of projects. For assessment purposes, homework, tests, portfolios etc were used. In the conclusion, students were found to be more skilful in problem solving and self-directed in decision making (Nair et al., 2002).

The integration of environmental education in pre- service programs to foster a sustainable society was another area of study by (Goldman et al., 2006). 765 students from three major teacher training colleges of Israel participated in the study. Emerging results showed that the major source of information was television while the internet was minor. On the relationship between behavior, attitude and knowledge, a high correlation was noted between attitude and behavior. However, the relationship between knowledge and behavior was minimal.

The need for informed environmentally literate citizens and how environmental education can address these needs was the subject of study by Ramey (2008). Under scrutiny in the research were childhood experiences and their potential impact fostering a caring concern for the environment. She surveyed 178 participants, aged between 20 and 67 years on the importance of getting children out in the natural world. The findings gave credence to the trends noted in literature pertaining to the importance of children experiences in the natural world. In her conclusion, Ramey (2008) stated that decision and policy makers should consider the trend in environmental education research in a bid to address the question of raising environmentally literate children and an environmentally responsible community.

The perceptions of children on global warming and energy resources in terms of psychological viewpoint and converging positional influences on the subjective ideas came under scrutiny in a comparative designed research done by Devine-Wright, Devine-Wright, and Fleming (2004). The participants were adults and young members of an educational organization called Woodcraft Folk as well as other young who were not the member of this organization. The results indicated that the cooperative learning environments positively influenced children's beliefs about environmental problems. Also noted was that children from members of the organization showed a higher level of awareness than children of non-members. A startling difference on the levels of self-efficacy of children and adult members of the organization was also noted.

The effect of the Caretaker Classroom Program on students' environmental attitude was studied by Leeming, Porter, Dwyer, Cobern, and Oliver (1997). The program embraces different activities to enhance the participation of students from varied background, age and interests. The participants were drawn from 35 classes in 11 schools. Through comparisons of the classes' pre-test and post-test scores, they discovered that students implemented activities related to environmental issues exhibited more positive attitudes than students who did not engage in any activity.

266 students in the sixth grade of a residential outdoor school of Washington country, Oregon were studied to determine the impact of two outdoor environmental

education programs: the Sunship Earth program and the traditional study of plants, animals, water and soil program. Payne (1981), who conducted the study, discovered that each program had a significant effect on environmental attitudes of the students.

The effect of teachers and school administrators' contribution on activities within the "Applied Environmental Training" project was evaluated by Şimşekli (2001). The study sampled Four pm-schools and ten primary schools from Bursa, Turkey. Evaluation of activities carried out in the schools was done by studying the activity reports during the inspections. Results showed that the teachers' environmental literacy was insufficient and this negatively impacted environmental education. Şimşekli (2001) suggested that, to improve environmental consciousness, the number and variety of environment related activities should be increased to cover the whole academic year.

In a study by Morgil, Yılmaz, and Cingör (2002), 30 students from Beypazari, Ankara were asked to do an environment-related project to be presented in the 2001-2002 education year. A pre-test and post-test was conducted on the students to establish the effect of the projects that are prepared by active labor of the students on their environmental knowledge. The conclusion was that Project based learning increased the students environmental knowledge.

Erten (2003) conducted a study to assess the effect of a one-week lecture pertaining to Garbage Reduction on attitude, behaviors and knowledge of 230, 5th grade students from Ankara. Erten discovered that after the program, there was a positive shift in the students' attitude towards the environment (Erten, 2003).

McNaughton (2004) studied the impact of educational drama lectures pertaining to education for sustainable development on primary school students aged 10 to 11 years. The lectures were carried out in two phases. Two classes selected from different schools participated in the study. The first phase included two sets of lectures with themes on sustainability citizenship and local and global. This was then repeated by another teacher with her class as a second phase. The lectures were conducted through the use of drama with the aim of improving the students' awareness, knowledge and action skills as well as enhancing positive attitudes toward environment. By the end of the study, it was found that drama provides easier learning in education for sustainability.

Students' comprehension of the greenhouse effect was a subject of study by Xiao-dong, Guang-jun, Qing, Lin, and Hui-feng (2007). The participants were fourteen year old students Chinese green schools. The students were divided into five groups each consisting of three pupils and then interviewed to ascertain their notions on the solutions for pollution due to factories and rising number of cars. It was observed that the students were confused when it came to solving the themes in real life (Xiao-dong et al., 2007).

E Alp, Ertepınar, Tekkaya, and Yılmaz (2006) studied the environmental attitudes of elementary school students in Ankara and the effect of class level and gender on the environmental attitude. 1140 students in 6th and 8th grades from 18 schools were selected for the study. A test administered revealed that although they possessed insufficient knowledge, their attitudes were positive. Gender was found to be of no effect in environmental knowledge. Girls were seen to have a more positive attitude towards the environment. Students in grade 6 also exhibited a more positive attitude.

Liu and Kaplan (2006), researched on the advantages of integrating adults into a monogenerational environmental education program for the young in Pennsylvania, USA. The attitudes and knowledge of the participants, who included youth and older adults, were assessed to determine the benefits of the interaction. Results showed an increase in the environmental awareness and knowledge of the youth such as caring for the environment.

In teaching global environmental problems to 7th grade students, Oluk and Özalp (2007) revealed the effect of applying constructivist methods. In the study, problem based learning method was applied to the experimental group students and traditional teaching methods were implemented in the control group students. The pre-test, post-test and interviews revealed that project based learning method was much more effective than the traditional methods.

In a study to measure knowledge and attitude towards environmental several aspects including issue understanding and concern, locus of control and verbal commitment related with the sea turtle conservation in Zakynthos Greece, Dimopoulos and Pantis (2003) noted a significant positive correlation between the environmental knowledge and environmental attitude. The participants were 352 students in the 6th grade.

Greek primary school teachers' understanding of three current environmental issues; acid rain, ozone layer depletion and greenhouse effect was evaluated by Michail, Stamou, and Stamou (2007). Quantitative and qualitative approaches were used in the research. A total of 155 teachers participated and many of them were found to have misconceptions about ozone layer depletion and greenhouse effects. There was, however, enhanced interest in environmental issues.

In conclusion, studies on education for sustainable development have proven that teachers' environmental literacy, environment-related activities and students-centered methods of teaching are significant to education. Also established is that private school students had more positive attitude towards the environmental than public school students. Females also tend to have more positive environmental attitude than males.

2.4 Outdoor Activities

Exposure to the environment is vital to learning. Rachael Carson, in the *Sense of Wonder* publication of 1956, expressed the importance of a young child's exposure to gain appreciation for it. Exposure to the environment arouses curiosity in a child about his surroundings. This makes him study it further leading to acquisition of the necessary factual knowledge (Carlson, 1956).

Outdoor experiences are advantageous and the positive outcome is immediately visible. A more positive attitude towards the wildlife was witnessed in students who participated in a residential program that incorporated a considerable amount of time in nature than was witnessed in students who had an in-class program on the same topic (Dettmann-Easler & Pease, 1999). The knowledge of scientific information and students attitude towards science can be enhanced through field trips (Falk & Dierking, 1997; Orion & Hofstein, 1991, 1994).

Students with varied outdoor experiences are noted to have a more favorable relationship with nature than those who do not. Apart from exhibiting better social behavior and self confidence, these children have been found to exercise an enhanced moral judgment. They also feel secure in outdoor activities. This was established by Palmberg and Kuru (2000) in a study that drew comparisons between students aged 11 and 12 years with varied levels of outdoor experiences.

Hands-on activities in environmental education were also endorsed by Chawla (1998). Chawla was of the opinion that outdoor activities that involved investigation and researches aroused the interest of students which then led to action. Childhood experiences in nature, according to Chawla, are one of the most effective factors in sensitizing people's awareness. More outdoor activities and experiences in the natural settings should be incorporated in environmental education for the betterment of children's awareness and participation (Chawla, 1999).

2.4.1 Seven Essential Elements Pertaining to Field Trips

2.4.1.1 Preparedness of Students

An impromptu outdoor activity in a new environment may end up being unproductive for the children. Without prior knowledge of what to expect, the children may dedicate themselves more to exploring the new setting and less to on task-learning.

The novel space was categorized into three factors by Orion (1993) as follows:

(i) Psychological novelty: This is in reference to the duration of the trip, expected weather conditions, timing of breaks, and expectations of the students.

(ii) Geographic: This is the specific path the trip will take

(iii) Cognitive: This involves knowledge of basic concepts and skills to be used as a basis for further learning on the trip (Orion, 1993; Orion & Hofstein, 1994).

Considerable preparation during field trips enhances learning. Orion and Hofstein (1994) established that best results in learning from field trips took place when a topic related to the trip had been initiated in class but had not been completed.

Experience from previous visits on the other hand, did not impede learning but enhanced it. Students with prior experience score significantly higher than those without. Owing to their benefits, field trips should be embraced as an essential part of the curriculum and not a reward.

2.4.1.2 A Field Trip Location

Outdoor activities such as field trips enable a student to make a connection between what he is learning and his environment. In the 1900s, John Dewey, opposed the dualities that distinguished school from the local community and went on to advocate for relevant education. In his advocacy, he stated that education should be a part of life and not a preparation for it. The curriculum, he said, should consist of a continuum of experiences that link student interests (Apple & Teitelbaum, 2001).

Organizers of field trips today have great lessons to learn from Dewey. A profound connection with the content and better comprehension of it can be realized by students through experience in their immediate surrounding as opposed to museum specimens which are of little relevance to every-day life (Woodhouse & Knapp, 2000).

2.4.1.3 Active Involvement

Paramount to effective learning is interaction with the instructional material (Tobin & Fraser, 1989). Cognitive and physical interaction with the environment occurs during field trips and researchers in this field have established the need for this (Millan, 1995).

The retention of knowledge and skills of students who participate in active versus passive excursions was evaluated by Mackenzie and White (1982) as they endeavored to establish the need for interactive learning. In the research, comparisons were drawn between the two groups. The results showed significantly higher cognitive gains in the active group than in the passive. The passive group on the other hand, showed higher gains than control students who did not participate in an excursion at all.

Although the acquisition of knowledge is important to a learner, the ability to translate that knowledge and skills into action in a novel situation should also interest an educator. Basile (2000) demonstrated that greater levels of transfer were realized through active involvement in a skill-based curriculum than more traditional classroom instruction.

Following a visit to US Forest Service in which fourth grade students engaged in games and listened lectured on environmental topics pertaining to the forest, an interview was conducted on them by Knapp and Poff (2001). The researchers found that the students excellently recalled the game rules and concepts but the recollection of the information presented in the lecture format was vague. Cognitive and physical active involvement, on the other hand, resulted in the best retention of information.

2.4.1.4 Multi-sensory Learning

Different people have varied intellectual strengths. This is according to Howard Gadner's theory of multiple intelligences (Gardner, 2011). A greater section of the various intelligences can be attained more effectively through stimulation of the learner's different senses. This notion gives credence to the discussion of active participation and hands on learning (Orion, 1993).

2.4.1.5 Cooperative Learning

Various studies on the benefits of cooperative learning environment to student achievement and behavior have been done. In a study by Watson (1991) and another by Chung and Son (2000), collaborative student groups were proven to have higher learner achievement than traditional classroom setting. Field trip instructions correspond to cooperative learning because sharing of materials by students is often required.

In environmental education, cooperation sets in motion a positive series of events that ultimately lead to the achievement of goals. A study by Lazarowitz, Hertz-Lazarowitz, and Baird (1994) demonstrated that a learner's self-esteem increases with cooperative learning. This in turn works well for a learner involved in nature activities as it increases their desire to take environmental actions (Dresner & Gill, 1994).

2.4.1.6 Constructivism

Constructivism is an education theory. According to it, an educator serves to help extract and build on the experiences that are already within the student. For effective acquisition of knowledge on a subject, each part of it must be understood and viewed in relation to the whole. Failure to understand the basics of a concept fragments learning which in turn, leads to misunderstanding and misconceptions.

According to Leinhardt (1992) constructivism is based on three insights. The first insight is that there are numerous ways of knowing and multiple kinds of knowledge. Novak (2010) stated that learning is more than acquisition of concepts. The relationship and connections between the acquired concepts is important because learning is interpretive process. The interdisciplinary and complex nature of relationships between environmental concepts gives credence to this statement. In environmental education, it is not just the content that is important but the manner in which environmental knowledge grows and changes.

In the second insight of constructivism, the importance and role of prior knowledge on how a person constructs knowledge in a discipline is considered. New information is often perceived on the basis of prior knowledge and this leads to misconceptions like those witnessed on environmental issues like ozone. The public focuses mainly on the problem of ozone depletion. This is in spite of the fact that disparities abound in equal measure ins scientific literature on the harmful effects of ozone on living organisms near ground level and the dangers of ozone depletion in the stratosphere (Hobson, 1993).

The third insight of constructivism is the recognition that learning and teaching are social acts. Interaction in an education setting is inevitable as teachers and students share language, reasoning patterns and problem-solving strategies. In environmental education the social aspect cannot be played down for the fact that it is interdisciplinary and for its problem-oriented focus of many environmental issues (Todt, 1995).

A fundamental principle in constructivism is that knowledge is acquired through experience. The benefits of cooperative learning environments can be enhanced through constructivist methodologies (Marinopoulos & Stavridou, 2002). For instance, a teacher who takes students on a field trip can refer to the experiences of the activity in future instructions.

2.4.1.7 Attitude Towards Learning

A positive attitude towards an education experience is very important. A negative view, for instance, about a field trip results in discouragement in the subject and the student may not want to pursue science as a career in future (Tressel, 1980). Environmental education strives for life-long learning (Simmons, 2000). A positive attitude is therefore fundamental to a learner's continued interest in the subject.

2.5 Curriculum

Carr and Kemmis (2003) and Stevenson (1993) stated that the three components of environmental education are associated with the technical, practical and critical curriculum models. Knowledge, skills and attitudes are emphasized in the technical curriculum model. This brings about its inclination towards the aspect of education about the environment. In this curriculum model however, subject content raises concern ((Robottom & Hart, 1993; Daniela Tilbury, 1994). In an evaluation of curricula from some countries, Chi Kin Lee and Williams (2001) found that the knowledge component was overemphasized in the proposals for environmental education.

According to Stevenson (1993), the practical or interpretative curriculum model is based on the assumption that learners actively engage in the construction of knowledge and meanings. Through experiences in the environment learners come up with meanings. The teacher is therefore tasked with organizing environmental activities that learners can engage in. The curriculum in this model is perceived to be practical due to the interaction of learners with each other, the teacher, teaching and learning materials and the environment.

The component of education for the environment is addressed in the critical curriculum model (Chi Kin Lee & Williams, 2001). Construction of knowledge and critical thinking on experiences and actions are encouraged with the aim of empowering the individual and society. The political, economic and cultural aspects of society are usually taken into consideration.

2.5.1 Integrating Environmental Education in the Curriculum

Integration of the curriculum into the school curriculum can be effected in various ways. So far there is no standard approach on how this can be done. The school curriculum can opt to have environmental education as an independent subject or as a cross-curricular issue infused in the entire curriculum through integration into the various subjects offered. It can also be incorporated as a theme centered on significant issues. These three approaches, though different, are suitable for the teaching of environmental education in schools. They are however dependent on the contexts in which they are implemented. These approaches are detailed in the following section.

2.5.2 Environmental Education as an Independent Subject

Incorporation of environmental education into the school curriculum as an independent subject means it is treated as a distinct part of the curriculum (Jackson, 1992). When accorded this status, environmental education gets a syllabus of its own and just like other subjects such as English, Science or Geography, it is allocated on the timetable.

The recognition that environmental education is not a subject with a body of knowledge and skills like other disciplines has raised arguments on the establishment of environment education as a distinct subject. Environmental education is perceived as a provision that engages learners to develop knowledge, skills and favorable attitudes towards the environment. Though UNESCO (1978) stated that environmental education is a curriculum orientation permeating the whole curriculum, this is not so in practice. According to Ferreira and Walker (1997), environmental education has been taught as environmental studies or environmental science in the school syllabus. In 1995, for instance, England reviewed its national curriculum and made environmental education one of the main subjects. This was after years of treating it as a cross-curricular issue (Chatzifotiou, 2006).

Even though environmental education can be incorporated as a single subject in the school curriculum, its ability to achieve the aim of environmental education which is to re-establish man-environment relationship in this status is disputed (A. G. Gough, 1997; Powers, 2004). Establishing environmental education as a single subject, it is argued, reinforces the separation of man from the environment. Looking back to the Tbilisi declaration, the opinion was that environmental education should not be just another additional subject in the curriculum but one that is incorporated into programs intended for all learners regardless of their age (T. D. UNESCO, 1978).

The teaching of environmental education would be easier if it was treated as a single subject. In addition, it would acquire its own identity (Sterling, 2004). This would however narrow its focus and it would negate its relation to other subjects (Rusinko, 2010). Moreover, if learners have the option of studying the subjects they want, some of them would not study it.

2.5.3 Integration of Environmental Education into Other Subjects

Integration of environmental content into subjects featured in the curriculum is another approach of incorporating environmental education into the school curriculum. Jackson (1992), refers to this approach as correlated-subject design. Klein and Merritt (1994), on the other hand, regard it as multidisciplinary. It has also been regarded as a whole curriculum approach to environmental education. In this instance, integration is perceived as the making of connections across disciplines. When environmental education is integrated into the school curriculum it becomes the "thread" that runs through the curriculum in its entirety. A theme or topic is addressed from the point of view of various subjects (Drake & Burns, 2004). The content in environmental education in this case, is drawn from the subject specific content of every subject. It does not therefore take the place of the subject but is treated holistically through all the areas of understanding and experiences (Daniella Tilbury, 1995).

2.5.4 Organization of the Curriculum

According to Flaws and Meredith (2007), organization of the curriculum around significant issues and problems is the most influential approach in the integration of environmental education into the school curriculum. Significant issues and problems are identified by teachers and learners regardless of limitations between subject areas. In this approach, the unit is centered on issues of concern as opposed to topics teachers and learners. The teacher is tasked with guiding the learners and provision of learning resources. While acting in groups, learners pursue a problem-solving process and agree on the issues to be investigated and the steps to be followed.

Centering the curriculum on significant issues and problems facilitates relevant and holistic learning. The relevance in learning stems from the involvement of learners in existent issues that may be of concern. Learners are presented with an opportunity to enhance their critical thinking skills which are vital in environmental education as they are involved in the identification, analysis and remedying of diverse issues and problems.

Hua (2004), stated that environmental education should extend from the classroom, to society and into our daily activities and nature. For example, when waste management is taught in the classroom, learners can take this to the society by discussing how poor waste management affects the environment and go on to do a clean-up exercise in their school, the school environment and even at home.

Active and participatory methods of instruction that are related to existent situations have been found to impact learning better. In environmental education, teaching methods that engage learners in higher order thinking skills, critical thinking and which stimulate learning are crucial (Moon, 2007).

2.6 Theoretical Foundations

For a society to actively engage in creating a healthy and sustainable environment, it needs to be well equipped with appropriate knowledge, values, and attitudes favorable towards the environment. In addition, it should be committed to protection and conservation of it. This is the objective of environmental education (Bass & Dalal-Clayton, 2012). For this objective to be realized, the philosophy steering the teaching and learning of environmental education must be examined.

2.6.1 Teaching of Environmental Education: Pedagogical Approaches

The assumption that knowledge powers transformation of behavior influenced the conventional methods of teaching and learning of environmental education. Communication of factual knowledge about the environment and environmental problems to learners dominated the teaching of environmental education. It was expected that this knowledge would translate to action. There have however been, in recent years, major modifications in the field of environmental education with various models being developed as tools for environmental learning. Focus is now not just on the provision of knowledge about the environment and environmental issues but also on carrying out investigations in the environment and taking on action (O'Donoghue & Russo, 2004).

Among the models devised for environmental learning framework was one by H. R. Hungerford and Volk (1990). In the creation of their model, they held on to the notion that individuals knowledge about the environment and matters pertaining to it would prompt modification of behavior. Their model was based on the assumption that an individual's motivation for responsible environmental behavior was directly proportional to the level of knowledge and awareness of the environment (H. R. Hungerford & Volk, 1990).

Another environmental learning framework model developed by O'Donoghue (2001) was more inclined towards remedying of environmental problems. It proposed learners focusing on an issue, making inquiries, seeking information, reporting their discoveries and then acting accordingly to remedy the problem. According to Hicks and Bord (2001), when teaching revolves around the environment and its associated problems only, it can elicit in students, feelings of uncertainty on their prospects of the future.

In 1998, Palmer developed a teaching and learning model for environmental education founded on the philosophy that effective environmental education should encompass education about, in or through, and for the environment (J. A. Palmer, 1998).

2.6.2 Teaching Methods of Environmental Education

Suitable teaching and learning techniques need to be employed if environmental education is to be successfully achieved. However, according to Chi Kin Lee and Williams (2001), there are no standard instructional methods in place for environmental education. Stevenson (2007) was of the opinion that learners should be involved in investigation of existent environmental issues and in actions to remedy them. This is due to the fact that environmental education is interdisciplinary in nature and holistic and interdisciplinary teaching and learning should therefore be employed. In 1992, Sterling also proposed teaching techniques that embraced participation (Sterling, 1992). This teaching technique in which students are actively involved emphasizes critical thinking by learners thereby making them take charge of the learning process. It is referred to as active learning (Kane, 2004; O'Donoghue, 2001). In the opinions of Ballantyne and Packer (2009) and Stevenson (2007), critical thinking skills required for analysis of issues related to the environment are developed through pedagogical activities which engage learners. This places a demand on teachers to incorporate suitable activities in the environment that present learners with opportunities to obtain actual experiences.

The experiences in the environment allow for investigation and analysis of the interrelationship between man and his biophysical environs. Practical experience is generally accepted as presenting a higher propensity for learning and this is true for environmental education which is associated with outdoor learning and experiential learning. These terminologies, each with its own objectives, are often used interchangeably as they have common purposes, focus and also for the fact that they occur in the environment (Adkins & Simmons, 2002).

In environmental education, teachers have an obligation not only to teach learners about the environment but also how to conserve it for the future. Varied activities when learning in the outdoors should be used to provide learners with a wide range of environmental experiences (Crompton & Sellar, 1981).

In addition to developing skills that aid in the acquisition of knowledge about the environment, outdoor activities enable students to see the varied relationships between the phenomena in their environment and the environmental problems. Moreover, learners get to understand the ecological processes and the effects of human activities in the environment through interaction with the natural environment (Meyers, 2006). According to Palmberg and Kuru (2000), this enhances environmental sensitivity, action skills, responsible behavior in nature, and social relationships and self confidence. This in turn aids the learners in the analysis of diverse conditions in the environment, recommending possible remedies to them and acting accordingly to save the environment.

A learner's association with the society and the environment leads to acquisition of vast knowledge and understanding of diverse subjects that are taught in school. This kind of knowledge is referred to as prior knowledge (Wood, 1998). These day to day experiences, according to research in cognitive and development psychology and science education, become a foundation for personal knowledge structures (Bell*, 2005). The challenge with prior knowledge is that it may have been misconstrued and may be devoid of scientific concepts (Limón, 2001). This can however be remedied through cooperative learning methods whereby learners share knowledge not only among themselves but also with the teacher who then gets to clarify the misunderstanding (Kane, 2004).

According to Vygotsky (1980), cooperative learning encourages acquisition of knowledge via social interactions and it is founded on a learning theory. This theory proposes that in addition to individuals building their own intellect, as advocated by Piaget and Bruner, the acquire knowledge from other individuals too (Wood, 1998). Littledyke (2008) further proposes that cooperative learning presents an opportunity whereby an individual's views can be weighed against other people's views and acknowledged. A variety of teaching techniques that include group discussion, project work, group investigation etc can be employed by a teacher in cooperative learning.

Various aspects of environmental education such as knowledge acquisition, skills and attitude development can be dealt with through investigative, experiential and cooperative learning. These teaching-learning techniques give learners room for inquiry into environmental issues. This in turn enhances knowledge and develops observation, recording and interpretations skills which are pertinent to understanding the environment (Meyers, 2006). This approach to learning is referred to as "place-based education" (G. A. Smith & Sobel, 2014). The main inclination of place-based education is the investigation of nature using the local environment as the setting for the exercise which, according to Van Petegem, Blieck, and Van Ongevalle (2007) , increases competence in action and critical thinking skills.

Place-based education aids in the growth of ecological identity and ecoliteracy which is defined by G. A. Smith (2007) as the understanding of interrelations in nature coupled by competence and attitude to conserve the environment. Ecoliteracy can simply be defined as the comprehension of the working order of the natural world (Orr, 1992). In addition, place-based education is also believed to positively influence attitude and behavior. These attributes of place-based education combined result in local ecological and cultural sustainability or the social and ecological wellbeing of the surroundings (Woodhouse & Knapp, 2000).

2.6.3 Critical Teaching in Environmental Education

The critical theory developed by Dewey (1859–1952) and Kant (1724–1804) proposes teaching in which, with the assistance of teachers, learners devise varied solutions to problems. They are also encouraged to view issues from diverse perspectives. Teachers in this case are expected to present the learners with challenges, motivate them to make inquiries that broaden their thinking and to deconstruct and reconstruct knowledge (Freire & Freire, 1998). According to Freire and Freire (1998), learners' experiences should be acknowledged. Teachers should endeavor to use these experiences as the starting point of teaching and thereafter show the relationship between what is to be learnt with real life situations. This kind of teaching is referred to as critical teaching. Facts from research studies have revealed that there is need for environmental education and education for sustainable development to adopt it because it deals not only with the individual but the society at large.

Carr and Kemmis (2003) agree that education should deal with issues facing the society. Gooch, Rigano, Hickey, and Fien (2008) further proposed that while applying the critical teaching approach in environmental education, learners, teachers and the society should be engaged in investigations of actual environmental issues in order to identify the fundamental socio-cultural norms to these issues. This calls for environmental education going further than the school setting.

Advanced levels of thinking skills are developed through critical teaching. Fisher (2005) and Gooch et al. (2008) were of the opinion that skills such as interpretation, analysis, synthesis, evaluation, making conclusions and self-regulation are promoted in students when critical teaching is employed. Knowledgeable individuals capable of thinking rationally about issues in their settings and take decisive actions are developed through critical teaching. Teachers employing this teaching method need to organize for learning activities centered on existing issues of relevance that are interdisciplinary in their making. This should be coupled with a learner-centered approach to teaching (Ernst* & Monroe, 2004) to encourage insightful thinking in learners (H. R. Hungerford, 2009). Critical thinking among learners enhances environmentally and socially responsible behaviors or action competence (Jensen & Schnack, 2006).

Critical teaching is a new approach to pedagogy and as such, there is need for teachers to be enlightened on how to put it into practice. It has however been effectively implemented in some countries like Australia, Canada and the United Kingdom in the teaching of environmental education. Emphasis is laid on environmental consciousness, environmental ethics, critical thinking and problem-solving skills through the study of existent world environmental and social issues (Gruenewald, 2003).

2.6.4 Content Knowledge of Teachers

In the implementation of environmental education, teachers' commitment is instrumental to its success (Bogler & Somech, 2004). However, while commitment is important, of major significance also is the teachers' content knowledge in environmental education.

A good foundation of knowledge in environmental education that includes skills, understanding and a disposition to collective responsibility is essential for teachers in the implementation of environmental education in schools. In addition a good teacher should be characterized by the ability to effectively communicate information and skills to learners (Palonsky, 1993). As put forward by Thornton (2001), content knowledge is important in environmental education but so are suitable teaching techniques. Pedagogical content knowledge (PCK), which is generally defined as a teacher's knowledge to facilitate learning, is something that should be possessed by all teachers (Shulman, 1987).

2.6.4.1 Pedagogical Content Knowledge

According to Tambyah (2008), varied pedagogical content knowledge is required in the instruction of diverse subjects owing to the fact that there are precise ways of teaching every subject. Pedagogical content knowledge (PCK) refers to knowledge that is associated with the instruction of a particular subject (Shulman, 1987). To be precise, it is the teacher's knowledge on how to facilitate learners' comprehension of the subject matter. It is in pedagogical content knowledge that teachers differ from specialists in a given area of study because knowledge of a subject is not tantamount to good teaching (Abell, Rogers, Hanuscin, Lee, & Gagnon, 2009).

There are five components in teachers' pedagogical content knowledge which include (Magnusson, Krajcik, & Borko, 1999):

- Orientation towards the teaching of a particular subject
- Knowledge of learners and their understanding
- Knowledge of the curriculum
- Knowledge of instructional strategies
- Knowledge of what and how to assess

In the teaching of environmental education, a teacher's orientation or understanding, which refers to the knowledge and beliefs that the teacher holds on the purpose and goals for teaching the subject, is of much significance. This is as proposed in the Shulman (1987) and Pamela Lynn Grossman (1990) model of pedagogical content knowledge. Further on, Magnusson et al. (1999) stated that a teacher's orientation determines his/her instructional strategy, learning tasks, use of teaching/learning resources and assessment methods. In other words, it determines how he/she conducts classes.

It is also important for teachers to familiarize themselves with their students' knowledge and understanding of environmental education. Teachers, especially in chemistry, should be clear on what the students need to learn, areas that prove challenging to them and the misconceptions they may have so that they can clarify. Learners, as research studies have indicated, are misguided on environmental phenomena associated with Chemistry such as the greenhouse effect, acid rain and the ozone layer (Khalid, 2001). Recognizing such misconceptions and clarifying them to the learners is a duty that Chemistry teachers need to undertake. In some instances, teachers may be knowledgeable in areas that challenge the learners while in others the teacher may lack sufficient knowledge to assist the students. In some scenarios, teachers may hold the same misconceptions as the learners (Magnusson et al., 1999). In-service training for teachers can be of great assistance in addressing this problem.

A teacher in any given discipline should be well-informed on the goals and objectives of teaching it. In addition, he/she should also be well-versed with its program and curriculum resources. Knowledge of the curriculum is a component of teachers' pedagogical content and it is regarded as the teachers' comprehension of the curriculum in its entirety as developed by Educational Development Institute (IZHA). In this regard the knowledge is inclusive of:

- The syllabus with its national and subject-specific aims and objectives of teaching a particular subject,
- Subject content
- Teachers' guides
- Students' texts
- Proposed teaching and learning materials

Teachers are charged with the interpretation of the syllabus. This is through preparation of schemes of work and lesson plans for teaching. This makes a teacher's knowledge of the curriculum very important (Van Driel, Bulte, & Verloop, 2005). Consequently, in circumstances where environmental education is integrated into a curriculum, teachers bear the responsibility of determining the integration of the environmental knowledge into the subject content and, with regard to the teaching plan, identify entry points for integration.

Every subject has teaching strategies that are applicable to it. Further, diverse topics in a subject can have specific teaching strategies that are applicable to them. A teacher needs to be well-versed on specific subject and even different topics' teaching strategies. Instructional strategies are actually a component of teachers' pedagogical content knowledge (Magnusson et al., 1999). Among the strategies used in the teaching of chemistry are outdoor experiences, investigation, exploration, problem-solving, simulations, inquiry and field excursions. These teaching strategies may however fail to be utilized in spite of the teachers' knowledge of them due to factors such as inadequate preparation, insufficient time, pressure of external examinations and large classes.

2.6.4.2 Subject Matter Knowledge

The knowledge required by a teacher in order to organize the concepts, facts, principles and theories of a given discipline is known as subject matter knowledge (SMK). Additionally, a teacher needs to know the rules of evidence used to generate and justify knowledge claims in the discipline. Subject matter knowledge (SMK) has an effect on pedagogical content knowledge (Abell, 2007). To effectively teach a given subject, a teacher requires subject matter knowledge in order to have the key facts, concepts, theories and principles otherwise referred to as substantive knowledge pertaining to that subject. Also needed is syntactic knowledge which pertains to the rules of evidence used to generate and justify knowledge in the discipline (Abell, 2007). In any given discipline, the number of courses covered and grades obtained sometimes determine the subject matter knowledge. It can also, however, be measured based on the teacher's conception of the subject content.

A positive correlation between science training and effectiveness in teaching has been identified by studies conducted among teachers. The subject matter knowledge of a teacher can therefore not be overemphasized given its relation to the teaching practice (Dobey & Schafer, 1984). A good foundation for teachers in their respective teaching subjects can therefore be said to be paramount to them teaching effectively. Even though it has been argued that subject matter knowledge is not tantamount to effective teaching, in the absence of it, structuring the knowledge to be taught as expected by subject specialists would prove to be a challenge to teachers. A teacher requires a significant measure of subject matter knowledge to develop pedagogical content knowledge (Magnusson et al., 1999).

2.6.4.3 Pedagogical Knowledge

The knowledge of instructional principles, classroom organization and management, learners and how they learn and educational aims is known as teachers' pedagogical knowledge. This foundation of knowledge is influential to teachers' pedagogical content knowledge (Abell, 2007). An understanding of the principles guiding instruction in the classroom facilitates a teacher's communication of the content to learners. A teacher's knowledge of good classroom organization and management also enhances learning and, in addition to the wide range of educational aims for teaching, he/she needs to be aware of the learners' knowledge and the learning process (Bransford & Schwartz, 1999).

Of major significance in the teaching profession is the application and utilization of knowledge in the classroom. Pedagogical knowledge differentiates teachers from content specialists as it combines content and pedagogy (Tambyah, 2008). Teachers' pedagogical knowledge can be viewed as the core of teaching as it characterizes the combination of academic content with instructional techniques and learners' interests and abilities to enhance learning (Shulman, 1987). This however does not discount the importance of subject content in teaching. The teachers' content influences not only what is taught but what is taught. Pedagogical knowledge and subject matter are actually mutually dependent (Pamela L Grossman, 1995). To a large extent, it is from teacher education, teaching practice and colleagues that pedagogical knowledge is acquired (Ernest, 1989).

2.6.5 Pro-Environmental Behavior

The tendency by an individual to consciously act in a manner that minimizes the risk of negatively impacting the environment or in a manner that promotes the quality of the environment is referred to as pro-environmental behavior (Jensen, 2002; Kollmuss & Agyeman, 2002). Educational programs are key to the impartation of knowledge, skills, attitudes and values that are effective in promoting transformation of individuals' behavior for positive environmental outcome in future. For more than forty years, studies have been conducted on the factors that influence pro-environmental behavior. This has been done in the context of psychology, sociology or environmental education (EE).

2.6.5.1 Effect of Environmental Knowledge and Awareness

Earlier perceptions held widely were that a people equipped with knowledge on environmental issues and what can be done to minimize negative effects on the environment would recognize positive and negative attitudes towards the environment (Hines et al., 1987). In response, it was expected that they would start acting accordingly in favor of the environment.

Extensive media coverage of environmental issues, though often dotted with erroneous explanations of scientific phenomena, has alerted people including pupils on their existence. Though knowledge-based programs enhance people's awareness and clarify misconceptions, they are often not successful in changing their attitudes. This means that they do not elicit behavioral transformation.

That behavioral transformation fails to occur, does not suggest environmental education programs should stop providing information. In the opinion of (Ajzen, 1991) who developed an influential theory of planned behavior (TPB), information is partly responsible for the development of beliefs regarding possible consequences of intended behavior. Attitudes and consequent behaviors are formed from beliefs.

Conceptual knowledge can be developed in pupils through activities in the environment that engage them in collection of real-world data, investigation of their immediate environment and practical application of new concepts. The pupils' interest in the topics they investigate during these experiential activities may be enhanced and this may inspire them to take on more work independently.

Among the factors at play in TPB is attitude towards an intended behavior which, in the opinion of Ajzen (1991), is founded on the belief of positive and negative consequences of such behavior. Subjective norms further serve to modify our attitude. For instance, our perceptions of what the people we regard highly do or fail to do, their likes or dislikes etc.

It is important to know the subjective norms of participants when considering the TPB. Among the strategies used to deal with this factor of subjective norms is the community based approach. In this approach, attention is paid to the entire community i.e. a neighborhood, family, school etc and not just on individuals. Other strategies that might be of use include relating experiences of people that the participants recognize. The integrity of teachers and lecturers is also vital in dealing with subjective norms.

In the development of pro-environmental behavior in people, environmental values and attitudes are significant. This is stated in the Stern's (2000) Value-belief-norm theory. There is a relationship between what people perceive as right and their actions. People feel morally obligated and behave responsibly when environmental values and attitudes are coupled with knowledge of an issue and personal responsibility is acknowledged (P. Stern, 2000; P. C. Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Practitioners, who are in agreement with this theory, endeavor to make pupils sensitive to the environment, enhance their love of nature and enforce their belief in the protection of the environment.

In the model of responsible environmental behavior (REB) developed by Harold H. Hungerford, the relationship between attitudes and behavior is perceived as fairly weak (Hines et al., 1987; H. R. Hungerford & Volk, 1990). While people may be in search of a relationship between attitude and behavior, diverse escapist strategies might easily blur such unions (Jurin & Fortner, 2002; Thapa, 1999).

Diverse forms of pro-environmental behavior present varied levels of challenges. For instance, recycling of items might seem sufficient to many people in their endeavor to align with favorable environmental attitudes. However in the real sense of the word, recycling has a fairly low impact on the environment. People engaged in recycling may also be frequent users of air travel, or may be big consumers of energy for heating. While this may be more challenging to change, it has a fairly high environmental impact (Jurin & Fortner, 2002).

Responsible environmental behavior can be inspired by philanthropic ideals (P. Stern, 2000). However, in some instances, self-centered values may also serve the same purpose. A case in point is where people consume organic food owing to their love for animals or nature while others consume it for health benefits or savor (Van Huylenbroek et al., 2009).

Environmental education conducted in the outdoors, present chemistry teachers with an exceptional opportunity to inspire and develop students' attitudes towards nature and environmental issues. Incorporation of sensory activities like earth walks or others that give students direct contact with the environment into environmental education is among the highly approved strategies (Van Matre, 1990). According to Kellert (1998) and Bögeholz (2006), it is important to present people with an opportunity to not only see nature but also to reflect on the significance of their experiences and to share.

There is an inclination in people to act according to their perceived capabilities and to also do what gives the expected outcome. In the presence of big environmental issues such as global warming, many people hold the perception that there is nothing they can do to change the situation. For this attitude to change, there is need for people to experience success that measures up to their efforts. Information on environmental issues, per se, is not a solution as people are often at a loss on what to do. In the opinion of Nagel (2005), awareness based environmental education programs often end up increasing people's frustration and indifference.

Environmental education programs should endeavor to not only equip learners with information on an issue but also present them with an opportunity to tackle it and witness change. In other words, EE should be action-based.

When learners witness achievements as a result of their actions, they develop a belief in their ability to effect positive change in their environment (H. R. Hungerford & Volk, 1990). Learners see the wisdom in their actions and know they can make a difference. In addition, practical skills required to tackle environmental issues are developed and they have a surety of their effective application.

Another major prerequisite for pro-environmental behavior according to TPB, Bandura (1997) and Ajzen (1991) is the perceived level of action skills and other like variables namely behavioral control, self-efficacy and action competence. There is a tendency in people to act according to their perceived capabilities.

There are pro-environmental behaviors such as recycling, switching off lights etc that are relatively common. These are routine behaviors that many people engage automatically without giving it any thought. The importance of routine behavior has been point of discussion to some scholars. Heimlich and Ardoin (2008) were of the opinion that these behaviors should be taught in early childhood to become routine.

A wide range of instruments are available in social marketing for the promotion of pro-environmental behavior. Lee and Kotler (2011) propose getting members of a target group to make a commitment such as signing an agreement to behave in a certain manner or to transform their personal lives etc. There are also instruments that endeavor to change social norms in a community e.g. giving car stickers that express a participant's behavior or adding individual's names on a website that promotes a given action etc.

While there is an assumption that promotion of pro-environmental behavior is universally accepted, enforcing environmental education has given rise to major ethical debates. In many quotas there have been debates about freedom of choice. For instance, it has been argued that teachers should not force pupils to comply with a desired behavior such as not littering the environment but should, on the contrary, respect the pupils' choice to behave irresponsibly in the environment.

In environmental education, focusing on pro-environmental behavior has been termed ineffective by some scholars (Breiting & Mogensen, 1999; Jensen & Schnack, 2006; Wals, 2012). Given the multifaceted scenarios without easy and clear remedies, focus should be on 'action competence' and not prescribed behavior for pupils. Visualization, holistic and critical thinking and openness to diverse perceptions often constitute these competencies. Engaging pupils in the formulation of goals and their project activities can help in developing their competence.

CHAPTER III: METHODOLOGY OF STUDY

This chapter presents the research methods used for conducting the study and explains why these methods were preferred for addressing to the research questions. This chapter starts with overall design of the study and the follows with population and sample, data collection methods, data collection instrument, validity and reliability of data collection instrument, data collection and data analysis procedures, limitations and external and internal validity of the study.

3.1 Research Design

The methodology of this study was primarily quantitative in approach. The findings were based on a survey research and content analysis, aimed at establishing the influence of Chemistry lessons on the environmental knowledge and awareness of students in grades 8 and 9. But at the same time the open-ended questions of teachers' instrument gave teachers the opportunity to elaborate on their replies. The responses to open-ended questions were subjected to both quantitative and qualitative approaches. The initial stage involved the assessment of the approved textbooks for the grades under study in order to identify environmental related topics contained in them and the national curriculum to scrutinize its environmental education objectives. This was followed by the issuance of questionnaires to the 8th and 9th grade students in public lower secondary schools in Tirana country and the chemistry teachers as well. This study also sought to establish the effect of the teachers' environmental knowledge and attitude on students' environmental knowledge and awareness. The role of teaching resources, the chemistry curriculum and the impact of utilizing environmental opportunities on students' environmental knowledge and awareness were also under investigation.

In the course of the study, the curricula of a number of subjects namely, biology, physics, geography, history, civic education, and Albanian literature and language were looked into to find out the number of environmental objectives contained therein. The percentage of these objectives in relation to other learning objectives in the curriculum in their entirety shows the extent to which environmental education is incorporated in the curricula and the importance attached to it. An assessment was done on a total of twenty eight textbooks to see the environmental topics included and the subjects and grades they were to be administered to.

In line with multi-stage sampling method, students and chemistry teachers from two municipalities in Tirana Country were evaluated. The sampling included students in grades 8 and 9 and chemistry teachers. After careful consideration of the qualities of the sample and the conceptual framework, the data collection mechanisms were devised. With this done and with consent (see Appendices A and B) from the Educational Department of Tirana City (DAR TIRANË QYTET) and Educational Department of Tirana Country (DAR TIRANË QARK), the pilot study and the data collection process commenced using the last devised instruments.

3.1.1 Population and Sample

Chemistry teachers in Tirana District public schools teaching grades 8 and 9 and their students were the target population of this study. The target population of this study was picked on the following basis:

- The success of the students on environmental matters is directly affected by the expertise of the teachers. The environmental literacy of chemistry teachers is therefore vital as they are at the centre of environmental education.
- For the purpose of sustaining the environment in future, children should be

equipped at an early age with the necessary knowledge, skills and attitudes that will facilitate their living in an environmentally friendly manner as adults.

- Character building is easier to achieve in young people. This therefore makes environmental education at the lower secondary level important and appropriate since it is all about equipping them with knowledge, skills and attitudes favorable to the environment. For the most part, the physio-neurological capacity is also developed at this stage in life thus making lower secondary school a vital level in education. Of importance also in imparting attitudes and values at this stage is that the learners can start acting to resolve environmental problems early in life.
- Although the teaching of chemistry starts at the 7th grade, prevalent environmental issues are addressed in the contents of the chemistry curricula of grades 8 and 9 which also include objectives.
- In the search for better economic opportunities, people from rural areas migrated to Tirana leading to population growth in country as never experienced before. Owing to this, Tirana became home to diverse cultures from Albania.

3.1.2 Sampling Procedure

Until 2000, Tiranë County was subdivided into two districts: Kavajë, and Tiranë. Since the 2015 local government reform, the county consists of the following 5 municipalities: Kamëz, Kavajë, Rrogozhinë, Tirana and Vorë ("Tirana County," 2015).

The Ministry of Education and Sports (MOES) has two educational departments which are Educational Department of Tirana City (DAR TIRANË QYTET) and Educational Department of Tirana Country (DAR TIRANË QARK) to direct schools in 27 mini-municipalities of Tirana and Vore. The Educational Department of Tirana City

(Qytet) is directing the schools which are located in urban area of Tirana (11 mini-municipalities) and The Educational Department of Tirana Country (Qark) is directing the schools which are located in rural area of Tirana (13 mini-municipalities) and Vore (3 mini-municipalities).

The 24 mini-municipalities of Tirana and 3 mini-municipalities of Vore and their corresponding villages are as follows:

Tirana : Tirana 1 mini-municipality (Ali Demi), Tirana 2 mini-municipality (Qyteti Studenti, Sauku), Tirana 3 mini-municipality, Tirana 4 mini-municipality (Babrruja), Tirana 5 mini-municipality (Blloku, Selita, Tirana e Re), Tirana 6 mini-municipality (Kombinati, Yzberishti), Tirana 7 mini-municipality, Tirana 8 mini-municipality, Tirana 9 mini-municipality (Lagja e Trenit, Brraka, Don Bosko (part)), Tirana 10 mini-municipality (Center) ,and Tirana 11 mini-municipality (Lapraka, Instituti, Don Bosko (part)).

Petrelë mini-municipality**:** Petrelë, Mullet, Stërmas, Picall, Shënkoll, Gurrë e Madhe, Gurrë e Vogel, Daias, Barbas, Fikas, Mangull, Qeha, Shytaj, Hekal, Kryezi, Percëllesh, Durishtë

Farkë mini-municipality**:** Farkë e Madhe, Farkë e Vogël, Lundër, Mjull Bathore, Sauk, Selitë

Dajt mini-municipality**:** Linzë, Shishtufinë, Tujan, Brrar, Ferraj, Priskë e Madhe, Surrel, Lanabreges, Shkallë, Qafmollë, Darshen, Selbë, Murth

Zall-Bastar mini-municipality**:** Zall-Bastar, Bastar i Mesëm, Bastar – Murriz, Vilëz, Zall-Mner, Mner i Sipërm, Bulçesh, Zall Dajt, Besh, Dajt, Shëngjin i Vogël, Selitë Mali

Bërzhitë mini-municipality**:** Ibë, Bërzhitë, Dobresh, Ibë e Poshtme, Pëllumbas, Mihajas-Cirmë, Kus, Fravesh, Kllojkë, Pashkashesh, Lugë-Shalqizë, Rozaverë

Krrabë mini-municipality**:** Krrabë, Fshatrat; Mushqeta, Skuterë

Baldushk mini-municipality**:** Baldushk, Mumajes, Fushas, Balshaban, Shpatë, Isufmuçaj, Mustafakoçaj, Koçaj, Kakunj, Vesqi, Parret, Shënkoll, Vrap, Shpat i Sipërm

Shëngjergj mini-municipality**:** Shëngjergj, Verri, Urë, Burimas, Shëngjin, Façesh, Bizë, Fage, Parpujë, Vakumone, Domje, Derje

Vaqarr mini-municipality**:** Vaqarr, Allgjatë, Arbanë, Bulticë, Damjan-Fortuzaj, Gropaj, Lalm, Prush, Vishaj, Sharrë

Kashar mini-municipality**:** Kashar, Yzberish, Mëzez, Yrshek, Katundi i Ri, Kus, Mazrek

Pezë mini-municipality**:** Pezë e Madhe, Pezë Helmës, Pezë e Vogël, Varosh, Maknor, Dorëz, Gror, Grecë, Pajanë, Gjysylkanë

Ndroq mini-municipality**:** Fshatrat, Ndroq, Zbarqe, Kërçukje, Zhurje, Lagje e Re, Pinet, Sauqet, Çalabërzezë, Shesh, Grebllesh, Mënik

Zall-Herr mini-municipality**:** Zall - Herr, Dritas, Çerkezë-Morinë, Qinam, Kallmet, Herraj, Pinar, Priskë e Vogël, Radhesh.

Vorë mini-municipality**:** Vorë, Marqinet, Shargë, Gërdec, Gjokaj, Marikaj, Picar, Kuç

Bërxullë mini-municipality**:** Bërxullë, Mukaj, Domje

Prezë mini-municipality**:** Ahmetaq, Breg-Shkozë, Fushë-Preset, Gjeç-Kodër, Ndërmjetës, Palaq

In order to select a representative sample, some pre-determined criteria were taken into account.

The researcher, in the initial stage of the sampling procedure, selected out of 5 municipalities, 2 municipalities of Tirana country namely Tirana and Vorë. This selection was done with regard to the administrative departments of Ministry of

Education and Sports (MOES) by considering their regions.

The above was followed by categorization of the mini-municipalities of Tirana and Vorë as either urban (city center) and rural (country and/or village). In Tirana, 11 mini-municipalities were classified as urban. In total, 16 mini- municipalities of Tirana and Vorë were classified as rural. The jurisdictions of Educational Department of Tirana City (DAR TIRANË QYTET) and Educational Department of Tirana Country (DAR TIRANË QARK) were taken into consideration in this process of this classification.

Upon the request of the researcher for the number of students and schools in each municipality, DAR Tirana City and DAR Tirana Country provided the following data:

DAR Tirana Country

Grade 8	1728
Grade 9	1687

The number of public schools in this region was given as 65.

DAR Tirana City

Grade 8	6096
Grade 9	5858

The number of public schools in this region was given as 64.

For the purpose of comparison at the conclusion of the study, a minimum of 30 students from each school were to participate. In the urban municipalities, the researcher excluded 11 schools that had 75 students in the 8th grade and 71 students in the 9th grade thereby reducing the target population to 6021 in the 8th grade and 5787 in the 9th grade. The target population was therefore drawn from 53 schools out of the 64 in the urban region. The same process was applied to the rural municipalities whereby

43 schools with pupils totaling 589 in the 8th grade and 577 in the 8th grade were excluded. This left the target population, drawn from 22 out of the 65 public schools, at 1139 in the 8th grade and 1110 in the 9th grade. Four mini-municipalities namely, Zall-Bastar, Shëngjergj, Ndroq, Zall-Herr, Prezë, and Bërzhitë were excluded reducing the rural area municipalities from 16 to 10. (See Table III.1 and Table III.2)

In the selected rural area mini-municipalities, the researcher opted to select one school per mini-municipality for the study. The selection of the school was determined upon consideration of the regions they were located, accessibility in terms and communication and time of study. The schools and the participating grade 8 and 9 students were picked at random.

The schools in the mini-municipalities of urban areas were also randomly picked but with regard to the pre-determined number of schools for each mini-municipality. The participants in each selected school were also randomly picked from the 8th and 9th grades.

Chemistry teachers teaching the 8th and 9th grades in the selected public lower secondary schools also formed part of the target population in this study. The participating teachers were selected through non-probability sampling method in addition to the multi-stage sampling method. Totally 41 chemistry teachers were participated from 39 selected schools out of 22 rural and 53 urban lower secondary schools. For the purpose of comparing teachers and students, the teachers were picked from the same school as the participating students and with majority of the schools having one chemistry teacher, the researcher took into consideration the ease of accessibility and time in his selection of teachers.

Table III.1 Number of the Grade 8 Students Drawn from Rural and Urban Areas in 21 Mini-municipalities of Tirana & Vorë

Municipalities	**Number of Selected Schools**	**Number of Students In Selected Schools**	**Number of Students Participated to the study**
Urban			
Tirana 1	1	138	35
Tirana 2	2	121	60
Tirana 3	1	60	30
Tirana 4	2	232	60
Tirana 5	2	268	60
Tirana 6	2	280	60
Tirana 7	2	239	100
Tirana 8	1	114	34
Tirana 9	2	240	60
Tirana 10	1	71	35
Tirana 11	2	253	60
Total (Selected)	18	2026	554
Total Number of schools and students in selected urban region: 53* schools and 6021 students. * Excluded 11 schools & 75 students (6 schools not have grade 8 classes & 5 schools have less than 30 students)			
Rural			
Petrelë	1	35	30
Dajt	1	85	54
Krrabë	1	39	36
Farkë	1	43	46
Baldushk	1	30	36
Vaqarr	1	30	41
Kashar	1	97	55
Pezë	1	36	40
Vorë	1	89	55
Bërxullë	1	125	55
Total (Selected)	10	609	409

Total number of schools and students in selected rural region: 22* schools and 1139 students.
* Excluded 43 schools (589 students) have less than 30 students. Excluded schools locate in Zall-Bastar, Shëngjergj, Ndroq, Zall-Herr, Prezë, and Bërzhitë municipalities.

Table III.2 Number of the Grade 9 Students Drawn from Rural and Urban Areas in 21 Mini-municipalities of Tirana & Vorë

Municipalities	Number of Selected Schools	Number of Students In Selected Schools	Number of Students Participated to the study
Urban			
Tirana 1	3	351	130
Tirana 2	3	180	100
Tirana 3	2	167	80
Tirana 4	2	248	100
Tirana 5	5	574	183
Tirana 6	3	430	130
Tirana 7	2	249	100
Tirana 8	3	283	90
Tirana 9	2	190	90
Tirana 10	2	178	80
Tirana 11	2	253	100
Total (Selected)	29	3103	1173
Total Number of schools and students in selected urban region: 53* schools and 5787 students. * Excluded 11 schools & 71 students (6 schools not have grade 9 classes & 5 schools have less than 30 students)			
Rural			
Petrelë	1	30	30
Dajt	1	71	54
Krrabë	1	36	36
Farkë	1	46	46
Baldushk	1	36	36
Vaqarr	1	41	41
Kashar	1	81	55
Pezë	1	40	40
Vorë	1	108	55
Bërxullë	1	113	55
Total (Selected)	10	602	448

Total number of schools and students in selected rural region: 22* schools and 1110 students.
* Excluded 43 schools (577 students) have less than 30 students. Excluded schools locate in Zall-Bastar, Shëngjergj, Ndroq, Zall-Herr, Prezë, and Bërzhitë municipalities.

Reaching all the Tirana country public school chemistry teachers and students of grades 8 and 9 in the 2014-2015 academic year was not possible. The multi-stage sampling procedure was therefore used and the reachable population determined using the aforementioned process (see Figure III.1).

In total, from 21 mini-municipalities of Tirana Municipality and Vorë Municipality, 963 students (508 boys and 455 girls) from the 8th grade, 1621 students (839 boys and 782 girls) from the 9th grade and 41 chemistry teachers (31 female and 10 male) participated in the study. According to official records of 2014-2015 academic year, the total of 8th grade students in Tirana Country and Tirana City was 7824.The study sample size (n=963) was calculated with 95% confidence level and 3% margin of error. According to official records of 2014-2015 academic year, the total of 9th grade students in Tirana Country and Tirana City was 7545. The sample size (n=1621) was calculated with 95% confidence level and 2.1% margin of error.

Table III.1 and table III.2 illustrate numbers of participants drawn from rural and urban areas in 21 mini-municipalities of Tirana and Vorë.

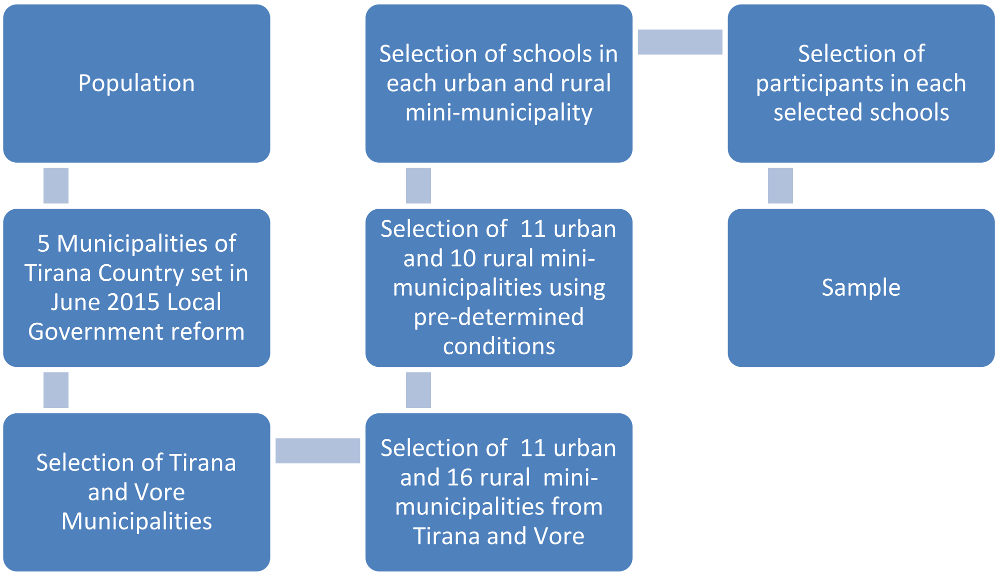

Figure III.1 Multi-stage sampling steps

3.2 Research Methods

3.2.1 Content Analysis

In defining content analysis, Krippendorff (2012) put it forward as a technique in research that makes replicable and valid inferences from data to the their context. By this definition, he encompassed that made by Berelson (1952) which termed content analysis as the description of the manifest content of communication and that of (Lasswell, 1948).

Any technique that makes inferences by objectively and systematically identifying specified characteristics of messages can be referred to as content analysis (Holsti, 1969). In research studies, any technique that capably studies human behavior in an indirect way through an analysis of their communication can be referred to as content analysis (Fraenkel & Wallen, 2000).

Neuendorf (2002), also gave another definition which described content analysis as a technique for collecting and analyzing the content of a text. Texts include books, newspapers or magazine articles, and official documents among others. In this context, content is also in reference to words, meanings, pictures, symbols, themes or any messages used for the purpose of communication.

Well depicted in the aforementioned definitions is that content analysis is a systematic and objective technique, which can be used to identify specified characteristics of messages and make inferences.

In studying culturally situated communication, as Saville-Troike (2008) stated, qualitative and quantitative aspects are not, per se, independent but should work collaboratively. Polit and Beck (2004), pointed out that qualitative and quantitative data present the best prospects of understanding human behavior, problems and characteristics.

According to Morgan (2006), quantitative content analysis involves the use of predetermined categories generated from the source. These are then subjected to a search process and analyzed quantitatively. The categorized data is then made more comprehensible. For instance, a researcher seeking comparison of terminology applications such as die or death by medical practitioners, patients and kin against indirect words such as pass away or demise can catalogue the words and thereafter search relevant documents for these terminologies and compare their application in each group through statistical measures (Forman & Damschroder, 2008).

On the other hand, categories in qualitative content analysis are created from the data and the application is more often than not, applied by studying it closely (Morgan, 2006). In qualitative content analysis, the researcher has the task of counting words or categories to identify patterns in the data. The patterns are then analyzed to comprehend their implications (Sandelowski, 2000). Qualitative content analysis extensively incorporates techniques that analyze data only at the exclusion of counting or statistical techniques as has been indicate by some researches (Elo & Kyngäs, 2008; Lewins, Taylor, & Gibbs, 2005).

With regard to this particular study, an in-depth qualitative analysis is difficult present owing to the extensive reading passages in textbooks and the curricula. A systematic and objective data in response to the “what” questions was therefore collected through quantitative content analysis. A logical presentation of the broad idea or inclination of the data was accomplished through analysis of the content to count the subcategory percentages of reading passages themes. In the presentation of the results, supplementary descriptions were also used alongside the simple percentages. This was purposely done for a better understanding of the role played by instructional materials on students’ environmental knowledge and awareness and the role of the chemistry curriculum in improving it.

The validity and reliability is enhanced through use of multiple coders, training to achieve consistency and establishing inter-rater reliability. This is referred to as triangulation (Brink, 1991). To increase the reliability and validity of this study, comparisons were made between the researcher and the second rater for the coding. The second rater, a Biology-Chemistry teacher, has a wealth of experience having taught in lower secondary school for many years using textbooks from diverse publishers.

3.2.1.1 Curriculum and Textbook Content Analysis Instruments

In order to collect data from the selected curricula and textbooks "Curriculum Analysis Instrument" (see Appendix S) and "Textbook Analysis Instrument" (see Appendix T) were developed by the researcher.

3.2.1.2 Content Analysis Procedure

From MoES, the researcher acquired the list of approved textbooks for grades 8 and 9 2014-2015 academic year. The books evaluated by using "Textbook Analysis Instrument" included those of chemistry, physics, geography, history, Albanian literature and language, and civic education. Initially, the researcher looked through the table of contents of the various books to establish the number of environmental topics such as acid rain, ozone depletion, greenhouse effect, air pollution, water pollution, chemical pollution, population, recycling, biodiversity, global warming etc. Thereafter, he went through the chapters of relevance.

In the curricula of the seven selected grade 8 and 9 subjects, were scrutinized to determine the number of environmental objectives by using "Curriculum Analysis Instrument". For comprehensive analysis of the data, the environmental objectives were grouped into major categories. At all points, coding was compared between the researcher and second rater.

3.2.2 Research instrument (Questionnaire)

Researches can sometimes be costly and time consuming. Owing to this, researchers sometimes opt for questionnaire as one of the data collection instruments. Questionnaires consist of questions that the researcher has no opportunity to personally ask the participants. Quite often, the questionnaires are mailed.

The information received from a questionnaire comes in a structured format and this comes in handy for the researcher. Moreover, the participants can, without the assistance of an interviewer, respond to questions. Shortcomings associated with a questionnaire include time consumption in the process of designing it and its scope is also limited as all potential answers cannot be presented. People are also often unenthusiastic when it comes to filling out a questionnaire and this makes getting a suitably large sample a challenge.

In a questionnaire, the questions can be in a closed format. This is where alternative answers are given and depending on the question, a respondent can choose one or more answer(s). The questions in a questionnaire can alternatively be in an open format or open-ended. In this, the respondents have the opportunity to present and to formulate their own responses.

In the use of questionnaires for research, the closed and open format kinds of questions have their measure of benefits and limitations. The closed format offers a faster way for respondents to answer questions. Coding and analyzing the data generated from the questionnaires also becomes easy for the researcher. The impression created by the closed format question may however be deceptive because the given alternative answers might not include the kind of response the participant would like to give. In the process, the amount of qualified information given is limited.

The open-ended questions, on the other hand, present the respondents with an opportunity to communicate their responses free from any pre-conceived notions arising from outlined response options. The open ended questions can however be challenging to a researcher when it comes to coding and analyzing them as misinterpretation is more likely to occur.

In the setting of a questionnaire, caution should be exercised in the way questions are phrased. Caution should be taken on the terminology and clarity of the questions ensured. This is important because questionnaires are entirely dependent on written language. Ambiguity or other grammatical errors can deter response. Effort should be made to keep questionnaires brief and precise with instructions as need be. Bias and distortion of information can result from leading question and this makes them unacceptable in questionnaires. For the respondents to be able to organize their thoughts and answer in a logical manner, sequence should be observed in the presentation of the questions preferably, from general to more specific information.

The terminologies used in the study must be clearly defined in the course of designing the questionnaire irrespective of the question formats. Some words or phrases tend to be ambiguous when interpreted by different people. Given the fact that the use of questionnaires is dependent on written language, clarity of questionnaire for easy understanding by the respondents is of utmost importance. Cohen, Manion, and Morrison (2000) said that:

> "An ideal questionnaire possess the same properties as a good law: it is clear, unambiguous and uniformly workable. Its design must minimize potential errors from respondents and coders... a questionnaire has to help in engaging their interest, encouraging their co-operation, and eliciting answers as close as possible to the truth. " (p. 106)

3.2.2.1 Students' and Teachers' Research Instruments (Questionnaires)

It was a critically important aim in this study to develop valid and reliable instruments. In order to collect data from the sampled 8^{th} and 9^{th} grade lower secondary school students “Class 8 Environmental Knowledge and Awareness Questionnaire (C8EKAQ)” (see Appendix C/D and “Class 9 Environmental Knowledge and Awareness Questionnaire (C9EKAQ)” (see Appendix E/F) and to collect data from the sampled chemistry teachers who work in public lower secondary schools “Teachers’ Environmental Knowledge and Instructional Skills Questionnaire (TEKAISQ)” (see Appendix G/H) were developed by the researcher. Students’ and Teachers’ questionnaires were developed as follows:

3.2.2.1.1 Analyzing the Existing Literature and Lower secondary School Curricula

A variety of data bases, books and studies associated with environmental education were scrutinized at the preliminary wide review of literature for this study. Also looked into were the 8^{th} and 9^{th} grade curricula for social sciences, science and interdisciplinary subjects like Citizenship Education.

The researcher took the initiative of searching for articles, extracting the information that was relevant to his study and thereafter classifying it for the purpose of analysis. This helped to identify matters that needed to be addressed and in determining the content and form of the questionnaire. Further identification of core issues to be addressed was accomplished through discussions with teachers and advisers. The environmental areas arrived at were acid rain, ozone depletion and greenhouse effect. For the grade 9 students, battery pollution was included. An item pool, C8EKAQ, C9EKAQ, and TEKAISQ was developed by the researcher for the purpose of this study.

3.2.2.1.2 Using Item Pool and Constructing the Students’ Questionnaires

Setting of the first version of the C8EKAQ and C9EKAQ which comprised gender, grade and age for demographic measures, was done using item pool. In each questionnaire, a total of 25 items were selected to ascertain the students' environmental knowledge. These items included 9 about acid rain, 5 about ozone depletion, 9 about greenhouse effect and 2 about battery pollution. To determine awareness and concern, 5 items were selected.

By use of the items pool, 9 items for C8EKAQ and 12 items for C9EKAQ were selected to ascertain the source of knowledge, influence of school and the subjects taught. Matters pertaining to the teaching/learning strategies practiced in the classroom formed the fifth series of questions. In this, the researcher opted for 3 items for C8EKAQ and 4 items for C9EKAQ. Voluntary outdoor activities embarked on by students formed the last series of questions and for this, the researcher opted for 2 questions to weigh the effect of these activities. 47 items and 51 items were included in the initial version of C8EKAQ and C9EKAQ respectively after the completion of item selection.

An assessment of the draft version of C8EKAQ and C9EKAQ was done by a chemistry biology teacher, a geography teacher, an Albanian literature teacher and language teacher. The areas of interest in their inspection included ease of comprehension and level of language, level of the content and conformity to the curriculum objectives and the students' development level. The teachers were also expected to evaluate the questions in the instruments to determine conformity with the environmental related topics and objectives in the 8^{th} and 9^{th} grades lower secondary education curricula and textbooks.

The researcher acknowledged the teachers' feedback (see Appendix I). The teachers proposed the exclusion of the "class" question for demographic measures because different questionnaires had been prepared for each class. The following changes were also affected:

Second series of questions

- The items for acid rain were reduced from 9 to 5
- The items for ozone depletion were reduced from 5 to 4
- The items for greenhouse effect were reduced from 9 to 8
- 5 of the retained items were placed under one question and enumerated afresh as a, b and c thereby reducing them to 3 items.

The battery pollution items were retained as in the original draft. The teachers also proposed retention of items measuring basic knowledge of selected environmental issues.

Third series of questions

- The 5 point Likert-type items were reduced to 4 point

Fourth series of questions

- The items pertaining to the influence of subjects were modified
- An open-ended part was added

Following the aforementioned modifications, C8EKAQ was left with 32 items and C9EKAQ 36.

The new version of the C8EKAQ and C9EKAQ were centered on six main aspects of practice. The first part related to the demographic measures including gender and age. The second series of questions dealt with the students' environmental knowledge about acid rain (C8EKAQ and C9EKAQ: Q3 to Q7), ozone depletion (C8EKAQ and C9EKAQ: Q13 to Q16), greenhouse effect (C8EKAQ and C8EKAQ: Q22 to Q24) and battery pollution (C9EKAQ: Q30 and Q35). This section was done by considering curricula of lower secondary school grade 8 and grade 9 science subjects, social science subjects and interdisciplinary subjects. Three types of question were used:

closed-ended questions with a multiple choice format with a single answer option (C8EKAQ and C9EKAQ: Q4 to Q7; Q14 to Q16; Q23 and Q24), closed-ended questions with yes/no (dichotomous) answers (C8EKAQ: Q3, Q13, Q22; C9EKAQ: Q30), and closed-ended questions with a multiple choice format with a multi select option (C9EKAQ: Q35). The third series of questions (C8EKAQ and C9EKAQ: Q8, Q17, Q25; C8EKAQ: Q30 and Q32; C9EKAQ: Q36 and Q38) were measuring students' awareness and concern about acid rain, ozone depletion, greenhouse effect and battery pollution (Grade 9 only). Two types of question were used: four point Likert-type ranging from very important to not at all important (C8EKAQ and C9EKAQ: Q8, Q17, Q25; C8EKAQ: Q30; and C9EKAQ: Q36) and closed-ended questions with a multiple choice format with a single answer option (C8EKAQ: Q32; C8EKAQ: Q38). The forth series of questions were measuring ways how students acquire knowledge about environmental issues. This part dealt with source of knowledge (C8EKAQ and C9EKAQ: Q9, Q18, Q26; and C9EKAQ: Q31), influence of school (C8EKAQ and C9EKAQ: Q10, Q19, Q27; and C9EKAQ: Q32), and influence of subject (C8EKAQ and C9EKAQ: Q11, Q20, Q28; and C9EKAQ: Q33). The fifth series of questions related to teaching/learning strategies employed in the classroom (C8EKAQ and C9EKAQ: Q12, Q21, Q29; and C9EKAQ: Q34). The type of questions was closed-ended questions with a multiple choice format with a multi select option. The last series of question (C8EKAQ: Q31; C9EKAQ Q37) related to outdoor environmental activities voluntarily undertaken by students.

Some of the closed-ended questions (C8EKAQ and C9EKAQ: Q9, Q11, Q12, Q18, Q20, Q21, Q26, Q28, Q29; C8EKAQ: Q30 and Q31; C9EKAQ: Q31, Q33, Q34, Q36 and Q37) with a multiple choice had "other" option with open- ended part. In total, 8th grade students' questionnaire (C8EKAQ) was containing 32 items and 9th grade students' questionnaire (C9EKAQ) was containing 38 items. Six items only were extra in 9th grade students' questionnaire about battery pollution other items were identical with 8th grade students' questionnaire. That addition was done by considering the 9th grade chemistry curriculum.

3.2.2.1.3 Using Item Pool and Constructing Teachers' Questionnaire

Items on teachers' gender, place of work i.e. name of school, the classes taught and the years of work experience were included in the demographic information part. A modification was however made to the item of work place to make it optional and added separately. To establish teachers' professional background, 3 items pertaining to the source of environmental knowledge and attendance of an environmental training course were included.

To facilitate his structuring of the item pool for content knowledge and environmental knowledge section, the researcher went through various research studies. His efforts culminated in an item pool comprising Likert-type, multi-choice, and open-ended questions. The researcher at first opted for 26 items that included:

- One Likert-type, a self evaluation on environmental knowledge
- One multi-choice item to measure content knowledge
- Four Yes-No to measure content knowledge

Twenty open-ended questions to measure content knowledge of environmental issues that included acid rain, ozone depletion, greenhouse effect, and battery pollution

A review of the open-ended questions was done by three (chemistry-biology, physics, and geography) experienced teachers (see Appendix I). The teachers proposed that the number of questions be reduced and that others be combined in order to manage the time taken. Heeding the teachers' advice, the researcher reduced the questions.

Further, using "which" and "what" questions, he combined the separate "cause", "consequence" and "cure" questions. This brought down the number of open-ended questions to four. In the Yes-No section, the researcher excluded questions that were similar to the open-ended questions and this left only two questions in this section. The 8 items were then appended to the TEKAISQ for the purpose of measuring the chemistry teachers' content knowledge.

To ascertain utilization of environmental opportunities like outdoor trips and extra-curricular activities, the researcher opted to have two additional items. Additional questions to ascertain the attitude and thoughts of teachers on environmental education were incorporated in the TEKAISQ. Two other items were added to assess the influence of utilizing instructional material. The researcher also opted to include one item from the item pool to enhance comprehension of the influence of the current chemistry curriculum on the students' level of environmental knowledge and awareness. On this, the researcher sought to know the teachers' point of view. Still on the teachers' questionnaire, one item was included to assess the teachers' concern on environmental problems and a further three items to evaluate the strategies employed in the teaching of chemistry and environmental topics in the classroom. The general structure of the instrument was summarized in Table III.3 below:

Table III.3 Content of Teachers' Environmental Knowledge and Instructional Skills Questionnaire

Component	**Number of Items**
Participant Characteristics (gender and taught classes)	2
Professional background (years of work experience, source of environmental knowledge and attendance to an environmental training program)	4
Environmental Activities	2
Attitude and Thoughts on environmental education	3
Instructional material	2

Curriculum	1
Knowledge	8
Concern	1
Strategies employed in the Classroom	3
Total	**26**

3.2.2.1.4 Taking Expert Opinions and Opinion of National Examination Agency

To secure expert opinion on the questions in C8EKAQ, C9EKAQ, and TEKAISQ prior to the pilot test, an external validity expert review panel was set up. An invitation was extended to 11 people from diverse fields of specialization that included ecology, environmental sciences, biology, chemistry etc. (see Appendix J). Upon their acceptance, seven documents describing the review of the instrument were prepared and sent to all.

The researcher, through the first document, gave insight on the purpose, method, sample and instrumentation of the study to the experts. A brief explanation of each section was given in this document. Copies of C8EKAQ, C9EKAQ, and TEKAISQ were attached.

The researcher designed External Validity Panel Evaluation Questionnaires in order to get their point of view generally on C8EKAQ, C9EKAQ, and TEKAISQ and the questions contained therein (see Apendices K/L, M/N, and O/P). The evaluation forms were divided into three parts with the first bearing questions geared towards obtaining demographic information about the experts. The second section consisted of Yes-No questions. The panel members were expected to offer an explanation for their chosen response. The first three questions sought to establish existence, if any, of bias in terms of gender, ethnicity and culture or social and region in C8EKAQ, C9EKAQ, and TEKAISQ. The researcher also sought to determine the comprehensibility of the questions in the instruments for students in grades 8 and 9 and the respective chemistry teachers. Effective and efficient way of administering the instruments to the participants was to be addressed in the last item of this section. In the third section, the researcher sought the experts' opinion on the suitable questions in the assessment of environmental related attainments. The questions had the option of Yes-No response but a brief explanation was required for each question or group.

C8EKAQ, C9EKAQ, and TEKAISQ were endorsed by the panel members as apt for the participant and the questions as good representation of the objectives of the instruments.

The National Examination Agency (AKP) of MoES, a special institution for technical and professional organization of national exams, was also requested to inspect the instruments and determine their:

(i) Validity in terms of any gender bias, cultural and ethnic bias, and social and regional bias

(ii) Clarity and comprehensibility for 8^{th} and 9^{th} grade students and chemistry teachers (see Appendix Q).

3.2.2.2 Validity and Reliability of C8EKAQ, C9EKAQ, and TEKAISQ

3.2.2.2.1 Validity

Validity refers to the appropriateness, meaningfulness, and usefulness of the specific inferences researchers make based on the data they collect (Fraenkel, Wallen, & Hyun, 1993, p.153). The validity of an instrument can be weighed by use of various pieces of evidence. Content related evidence is one measure of validity. According to Fraenkel et al. (1993), content related evidence is the extent to which an instrument logically appears to measure an intended variable and can be determined by expert judgment.

3.2.2.2.2 Content and Face Validity

Content validity majorly inclines towards the content and format of the instrument with reference to the extent the instrument incorporates the intended content. It also considers the inclusion of relevant formats in terms of the items being visual, understandable and easy to follow for the target group. Content validity was further classified by Gay, Mills, and Airasian (2011) into item validity which refers to the relevance of the items in the instrument to the intended content and sampling validity which refers to the suitability of the instrument in reflecting the content area to be tested in its entirety.

Further support of content validity stems from face validity which lays emphasis on the format of the instrument. The clarity of printing, adequacy of work space, appropriateness of language, and clarity of direction constitute the instrument's format (Fraenkel & Wallen, 2000).

In designing C8EKAQ, C9EKAQ, and TEKAISQ, the researcher in this study employed diverse methods to provide sufficient evidence for content and face validity. Separate questionnaires prepared for each of the instruments for the purpose of obtaining expert opinion. In responding to the questionnaires, the experts were expected to air their views with regard to the content coverage, format of the parts, clarity of item and directions and relevance of the items to 8^{th} and 9^{th} graders and chemistry teachers. This is an indication of profound evidence for content and validity of the format. The content and face validity of the instruments was also evaluated by experts from the National Examination Agency of MoES (AKP).

3.2.2.2.3 Reliability

Davidshofer and Murphy (2005) and Fraenkel and Wallen (2000) described reliability as the consistency of the scores which is then expressed numerically, as reliability coefficient. Diverse types of evidence for reliability are used for diverse kinds of consistency (Gay et al., 2011). To test the reliability of the data collection instrument for this study, the researcher employed the internal consistency reliability which refers to consistency among the items. Specifically for this study, a calculation of Kuder-Richardson (KR20) and Cronbach's Alpha Reliabilities was done to test the relation of the items in the test to each another.

The reliability analysis was performed over the data gathered through the pilot testing with eighth (n=39), ninth (n=47) grade students, and teachers (n=10). Since Kuder Richardson method is more appropriate for the items scored dichotomously (e.g. 0 and 1), this was used for C8EKAQ and C9EKAQ, including Multiple Choice items. In the C8EKAQ and C9EKAQ, correct responses were coded as 1 and wrong as 0. On the other hand, since Cronbach Alpha Reliability method is more appropriate for Likert Type items, this was used for TEKAISQ.

For C8EKAQ and C9EKAQ, Kuder Richardson 20 (KR20) formula was calculated for determining coefficient alpha (α) of the instrument. KR20 was used for thirteen multiple choice questions. The reliability of thirteen multiple choices items and subjected to KR20 was found 0.60 (average of grate 8 and grade 9). Cronbach's alpha correlation coefficient (α) TEKAISQ of was found 0.59.

3.2.2.3 Data Collection Procedure

The necessary permits were secured by the researcher from DAR Tirana City and DAR Tirana Country (see Appendices A and B). After carrying out this exercise, the researcher went ahead to hand out the questionnaires to the heads of schools. The help of teachers was enlisted owing to the constraints of time and for ease of administration. The researcher also briefed the teachers on the study he was conducting, clarifying the instructions and offering explanation as needed.

The students were assured of confidentiality by being asked not to disclose their names on the instruments. They were further informed that the questionnaires were vital to a scientific study but their scores would not in any way influence their grades. They were further informed that it was a voluntary exercise and they could decline to complete the instrument if they so desired. The questionnaires, which needed 20-25 to complete, were administered in the classroom with the help of the class teachers.

The headmasters/headmistresses of the various schools took the responsibility of teachers' questionnaires so that they could hand them over to the respective grade 8 and 9 chemistry teachers. These were then collected from the heads of schools by the researcher within a period of three weeks. At the conclusion of the data collection process, 963 questionnaires of 8^{th} grade students, 1621 questionnaires of 9^{th} grade and 41 teachers' questionnaires were returned. This translated to a return rate of 96%, 93% and 90% respectively.

3.3 Data Analysis Procedure

The Statistical Package for Social Sciences 20.0 (SPSS) was used for the analysis of the results of C8EKAQ, C9EKAQ, and TEKAISQ. Analyses applied to quantitative data collected from the C8EKAQ, C9EKAQ, and TEKAISQ included: descriptive statistics of the survey results, correlational analysis to determine interrelationships among variables, and analysis of variance to search for significance of any relationships and interactions among variables.

A hierarchical coding procedure was used to code the qualitative responses to the open-ended questions in TEKAISQ. SPSS was then used in the production of descriptive and frequency statistics quantitatively.

For quantitative content analysis of this study, the entire data collected from textbooks and curricula was coded into categories. Comparison with the scores on

C8EKAQ, C9EKAQ, TEKAISQ and data collected in the open-ended questions was done using numbers and percentages.

3.4 Methodological Limitations

1. This study is limited to public lower secondary school in two municipalities of Tirana Country (District).
2. This study is limited to 8^{th} and 9^{th} grade students.
3. This study is limited to the 8^{th} and 9^{th} grade chemistry teachers.
4. The sample of the study is limited to 963 (n=7824) 8^{th} grade and 1621 (n=7545) 9^{th} grade public schools students from selected 21 (n=27) mini-municipalities.
5. The sample of the study is limited to 39 (n=122) public schools.
6. Knowledge questions might not reveal an accurate result due to their multiple choice format since the students might have chosen the correct answer by guessing, although “Other” and “ I do not know” choices were provided to prevent doing so.
7. Knowledge dimension of C8EKAQ and C9EKAQ have low reliability (0.62 and 0.58 respectively).
8. The study focused on the influence of chemistry on students’ environmental knowledge and awareness at the exclusion of environmental attitude, environmental behavior, and environmental concern.
9. Topics on environmental issues may not have been covered in class at the time the questionnaire was presented.
10. Only seven curricula and 28 textbooks were scrutinized.

3.5 External Validity of the Study

According to Fraenkel et al. (1993), external validity refers to the extent to which results can be generalized or applied to groups and environments outside the research setting. External validity can be viewed from two perspectives i.e population generalization and ecological generalization.

The samples in this research were taken from 21 mini-municipalities from 2 Municipality of the Tirana Country (District). In the selection of the sample, a number of factors were taken into account. These included among others:

- The developmental ranking of the mini-municipality in the country
- The location of the school in mini-municipality
- The representative percentages of the sample in the region

This study can therefore be generalized in the existent students and the chemistry teachers in the state schools of the 5 municipalities in Tirana.

3.6 Internal Validity of the Study

Elimination of threatening factors that influence internal validity is vital to managing the internal validity of a study. For instance, selection of the participants can result in unintentional differences in the individuals or groups that are related to the variables to be studied. Fraenkel and Wallen (2000) defined this as subject characteristics threat. To limit this threat, a researcher needs to control characteristics of the participants such as age, gender, socio-economic status etc. the researcher in this study took control through inclusion of students' different characteristics. The participating students were all from public schools and presently in the 8^{th} or 9^{th} grade. Moreover, their ages and gender came in equal measure.

In the course of a study, some participant may opt out. Fraenkel and Wallen (2000) described this as mortality threat. Enlisting the assistance of class teachers to administer the data collection instrument during the class hour helped the researcher to eliminate the threat to internal validity from mortality in this study.

Varied explanations for results can arise from given locations which data is collected from. This is described by Fraenkel and Wallen (2000) as location threat. For this study, location posed no threat as data collection instruments were administered in classrooms under similar conditions.

Unintentional alteration of the results by a data collector can occur in the course of data collection. This can affect the results of the study and is referred to by Fraenkel and Wallen (2000) as data collector characteristics threat. Teachers' help was enlisted in the administration of the questionnaires so data collector characteristics posed a threat. To counter this, the researcher provided the data collectors with information about the study.

Carrying out a pretest for the purpose of improvement can result in what is referred to by Fraenkel and Wallen (2000) as testing threat. This kind of threat was not a point of concern to the internal validity of this study because the instruments were used only once.

The internal validity of a study can also be threatened by the participants' attitude towards it. Fraenkel and Wallen (2000) termed this as attitude of subject threat. This may have posed a threat to the present study owing to the fact that the students were informed that the questionnaires were not part of their lessons and the results were only meant for scientific study. The students were also not required to write their names on the papers.

3.7 Ethical Issues

Conducting a research study demands personal investment of time and emotional commitment from the participants. This particular study required teachers to invest their already limited time. This presents the researcher with fundamental ethical challenges to rationalize his project and assure the participants that their participation is for the common good or neutral and not harmful. The significance of the researchers' pursuit of the goals of the project must be established with regard to furtherance of knowledge. The researcher must also be qualified to attain the goals. The aforementioned issues underscore the accountability of the researcher to the participants, funders, and other educational researchers, which are elaborated (Association, 1992).

Students and teachers of public lower secondary schools, who constituted the participants of this study, were enlightened on the objectives of the research. They were aware that the data collected would solely be utilized for research purposes and that the research would not affect the assessment of their performance in their work places.

Anonymity, privacy and confidentiality were maintained throughout the research. An email address was included for students or parents who wished to inquire on the research. The questionnaire also contained a declaration of confidentiality with regard to the students' answers and an assurance that they would solely be used for scientific studies or purposes. To guarantee confidentiality of the research data, the students and teachers did not disclose their identities on the instruments.

The questionnaires and other data pertaining to this study will not be accessible to other persons except the author. Upon completion of the thesis, the documented data will be stored in a compact disc and securely stored while other materials pertaining to the research will be destroyed.

CHAPTER IV: RESULTS AND DISCUSSION

This chapter begins with brief descriptions of the participants of the study. The data pertaining to the general characteristics of the sample (teachers) were given in a descriptive manner with frequencies and percentages. Thereafter, answers to the research questions were investigated descriptive analyses of the data, content analyses of curricula and textbooks and inferential analyses of the data. The answers to the questions addressed in this thesis are summarized in a series of tables and figures followed by explanations. The presentation of the results matched the sequence of the research questions stated in the introductory part.

4.1 Characteristics of the Participants

Some of the basic characteristics of participants were already given in Methodology of Study Chapter (see 3.1.2). The general characteristics of the teacher participants are presented below.

4.1.1 Professional Background

The professional background of chemistry teachers has been described by virtue of their years of work experience, source of environmental knowledge, level of education, and their attendance of environmental in-service training programs.

4.1.2 Work Experience:

As displayed in Table IV.1, 43.9% of the chemistry teachers in this study have over 20 years working experience, 31.7% have 11-20 years working experience, 12.2% have 6-10 years working experience and 12.2% have less than 5 years experience.

Table IV.1 Participants' years of work experience

Q2. How many years of work experience do you have?

	0-5 years	6-10 years	11-20 years	over 20	Total
Frequency	5	5	13	18	41
Percent	12.2	12.2	31.7	43.9	100.0

4.1.3 Teachers' Source of Environmental Knowledge:

The most popular sources of environmental information stated by the chemistry teachers in this study were internet (25.0%), magazines and books (13.8%), and TV and radio programs (13.2%). As an environmental information source, school/university (12.5%), voluntary organizations (10.5%), non-governmental agencies (8.6%), and newspapers (7.2%) were also indicated. Results indicated that government agencies and friends/family are rarely used (4.6% each) as a source of environmental knowledge (Table IV.2).

Table IV.2 Teacher participants' environmental information sources

Q7. How do you get information about environmental concepts and issues?

	Responses		Percent of Cases
	N	Percent	
TV/Radio	20	13,2%	48,8%
Magazines/Books	21	13,8%	51,2%
Newspapers	11	7,2%	26,8%
Friends/Family	7	4,6%	17,1%
Internet	38	25,0%	92,7%
Government agencies	7	4,6%	17,1%
Voluntary organizations	16	10,5%	39,0%
Non-Governmental agencies	13	8,6%	31,7%
School/University	19	12,5%	46,3%
Total	152	100,0%	370,7%

Table IV.2 reveals that 38 (n=41) chemistry teachers chose internet as a primary environmental information source and almost half of the chemistry teachers (n=19) indicated school/university as an environmental information source. However, only 7 teachers (n=41) indicated government agencies as an environmental information source. The results indicated lack of government support.

4.1.4 Environmental In-Service Training:

As indicated, more than half of the chemistry teachers in this study (53.7%)

attended an in-service training program on environment. However, 46.3% of the chemistry teachers stated that they had not attended an environment related in-service program (Table IV.3). Among the 22 teachers who said "yes", 17 of them participated in "Green pack training", the remaining 5 teachers participated in the biodiversity protection seminar, REC environment training program, environmental education seminar (see Appendix Y). Environment master program and seminar were not mentioned in detail. Green pack training were introduced in 2006-2007 academic year by REC Albania and MoES as a government policy that's why teachers were got the training. It can be said that in effective environmental education role of teachers is vital and government should take in-service environmental training in every year policy.

Table IV.3 Participation of environmental in-service training

Q 23. Have you participated in in-service training?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	46,3	46,3	46,3
	Yes	22	53,7	53,7	100,0
	Total	41	100,0	100,0	

Among the participants, 63.6% found the training very helpful and 36.4 found the training fairly helpful (Table IV.4). Content and methods of training needed to be updated and modified.

Table IV.4 Opinions of participants on in-service training

Q24. Was the training helpful?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fairly helpful	8	19,5	36,4	36,4
	Very helpful	14	34,1	63,6	100,0
	Total	22	53,7	100,0	
Missing	skipped	19	46,3		
Total		41	100,0		

There was an open-ended question (Q25) in TEKAISQ (Appendix G/H) related to the comments on the "Green Pack Kit". Teachers found the pack in general very helpful. For example, Teacher 16 suggested that *"the green pack should be updated for use in grade 7 (per mendimin tim ky liber duhet te zhvillohet ne shkolle duke filluar qe ne klasen e shtate).*"

Teacher 23 suggested that "*green pack should be implemented as a separate subject: it was excluded from schools using it as an extra-curricular activity two years ago. (Paketa e gjelber duhet te vendoset si lende:Veprimtari ekstrashkollore e cila ka dy vite qe eshte hequr).*"

Other common responses to the question were as follows:

- Helps students increase their understanding of environmental problems
- Increases environmental awareness
- Well prepared supplementary material for lessons
- Develops an interest in and understanding of environmental problems
- It is helpful not only to students but also to teachers (for more comments see Appendix Z).

4.2 Students' Environmental Knowledge and Awareness Level and Content Knowledge Level of Chemistry Teachers

The first research question in this study was on the extent to which content knowledge of chemistry teachers affected environmental knowledge and awareness of grade 8 and 9 students. To answer this question, the following null hypothesis was tested: *"There is no positive relationship between 8^{th} and 9^{th} grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge."*

To examine the null hypothesis, the following steps and analyses were taken:

Step 1: Analysis of students' awareness level on environmental problems

- students’ information level (descriptive results) (see 4.2.1.1)
- students’ knowledge level (descriptive results and chi-square correlation analysis) (see 4.2.1.2)
- personal importance level (descriptive results and chi-square correlation analysis) (see 4.2.1.3)

Step 2: Analysis of source of knowledge (descriptive results and chi-square correlation analysis) (see 4.2.2)

Step 3: Analyzing influence of school subjects on students’ environmental knowledge and awareness (descriptive results) (see 4.2.3)

Step 4: Analyzing effect of chemistry subject on students’ environmental knowledge and awareness (descriptive results and chi-square correlation analysis)(4.2.4)

Step 5: Analyzing effect of the chemistry teacher on students’ environmental knowledge and awareness (see 4.2.5)

- Students’ perspective: Effect of teachers and effect of their used methodology/pedagogical approaches to teach environmental topics during the lesson (descriptive results)
- Teachers’ perspective: Teachers’ used methodology/pedagogical approaches to teach environmental topics during the lesson (descriptive results)
- Teachers’ content knowledge level (descriptive results)

Step 6: Examining chemistry teachers’ content knowledge as predictors of students’ environmental knowledge and awareness (Inferential statistics: binary logistic regression analysis) (see 4.2.6)

4.2.1 Students' Awareness Level on Environmental Problems

4.2.1.1 Having Information on Environmental Issues

The students' information level on acid rain, ozone depletion, greenhouse effect and environmental damages of batteries is presented in Table IV.5 by means of frequencies and percentages. As presented in Table IV.5, 8th grade students' "yes" responses were high; 99.3% respondents had heard about acid rain, 96.3% respondents had heard about ozone depletion, and 94.4% of respondents had heard about greenhouse effect. 9th grade students' "yes" responses were almost the same as grade 8 students; 96.2% respondents had heard about acid rain, 94.4% respondents had heard about ozone depletion, 93.6% of respondents had heard about greenhouse effect, and 86.8% of respondents had heard about environmental damages of batteries. The most heard environmental problem among both grades' respondents was acid rain and least heard environmental problem was greenhouse effect among 8th grade respondents and environmental damages of batteries among 9th grade respondents.

Table IV.5 Having information: frequencies of 8th and 9th graders on environmental issues

Have you heard about……..

		Grade	No	Yes	Missing/skipped	Total
acid rain? (item-3)	Frequency Percent	8	7 0.7	956 99.3	-	963
	Frequency Percent	9	38 2.3	1560 96.2	23 1.4	1621
ozone depletion? (item-13)	Frequency Percent	8	36 3.7	927 96.3	-	963
	Frequency Percent	9	90 5.6	1531 94.4	-	1621
greenhouse effect? (item-22)	Frequency Percent	8	49 5.1	909 94.4	5 0.5	963
	Frequency Percent	9	93 5.7	1518 93.6	10 0.6	1621
environmental problems caused by batteries (item-30)	Frequency Percent	9	180 11.1	1407 86.8	34 2.1	1621

4.2.1.2 Students' Environmental Knowledge

The results of the 13 items on the C8EKAQ and C9EKAQ on environmental knowledge are presented in Table IV.7 and Table IV.8. In "knowledge" questions of C8EKAQ and C9EKAQ, each item has a correct response choice. Data was evaluated according to coding correct responses as "1" and the other alternatives as "0". Participants' knowledge levels (grades) were stated by sum of the correct answers for 13 environmental knowledge items ranged from 0 to 13. Only 17 (1.8%) 8^{th} grade students (n=963) and 33 (2.0%) 9^{th} grade students (n=1621) correctly answered all knowledge items (Table IV.6). Below the Table IV.6, results indicate that among 8^{th} and 9^{th} grade students, greenhouse effect was a well known concept with 28.9% and with 24.1% respectively. Second well known concept was acid rain with 17.1% from both 8^{th} and 9^{th} grade students. This was followed by ozone depletion with 16.7% of 8^{th} grade students and 13.7% of 9^{th} grade students. Out of the 13 questions of C8EKAQ and C9EKAQ, the mean scores were 8.31 and 8.04 with standard deviations of 2.72 and 2.87 respectively.

Table IV.6 8^{th} and 9^{th} grade respondents' frequency and percentage distributions of correctly answered knowledge items

Categories	Number of respondents answered correctly	Percent of respondents answered correctly	Gender number and percentage	
8^{th} Grade (n=963)			Boy	Girl
Acid Rain (4 items)	165	17.1%	85 (51.5%)	80 (48.5%)
Ozone Depletion (3 items)	161	16.7%	76 (47.2%)	85 (52.8%)
Greenhouse Effect (6 items)	279	28.9%	141 (50.5%)	138 (49.5%)
All (13 items)	**17**	**1.8%**	**11 (64.7%)**	**6 (35.3%)**
9^{th} Grade (n=1621)				
Acid Rain (4 items)	277	17.1%	136 (49.1%)	141 (50.9%)
Ozone Depletion (3 items)	222	13.7%	111 (50.0%)	111 (50.0%)
Greenhouse Effect (6 items)	390	24.1%	190 (48.7%)	200 (51.3%)
All (13 items)	**33**	**2.0%**	**19 (57.6%)**	**14 (42.4%)**

Table IV.7 Summary of responses of 8th grade students to the knowledge questions

8th grade participants' responses to the knowledge questions (n=963)							
		Frequency (*f*) and Percentage (%)					
Items regarding environmental knowledge	**Correct Answer**	**A**	**B**	**C**	**Other**	**I don't know**	**Missing**
Acid Rain							
4. What do you think acid rain is?	A	**558**	345	6	20	16	18
		57.9	35.8	0.6	2.1	1.7	1.9
5. How do you think acid rain produced?	A	**672**	230	8	7	26	20
		69.8	23.9	0.8	0.7	2.7	2.1
6. What are the consequences of acid rain to human beings and environment?	A	**726**	84	105	12	20	16
		75.4	8.7	10.9	1.2	2.1	1.7
		City	Village	Both			
7. Do you think that the acid rain appears in the city, in the village or in both of them?	Both	415	20	**503**			25
		43.1	2.1	**52.2**			2.6
Ozone Depletion							
14. What do you think the ozone layer does?	B	87	**771**	19	8	29	49
		9.0	**80.1**	2.0	0.8	3.0	5.1
15. The most effective gas which causes ozone layer destruction is	B	498	**261**	45	10	97	52
		51.7	**27.1**	4.7	1.0	10.1	5.4
16. If the ozone layer problem becomes worse,	C	47	227	**561**	28	47	53
		4.9	23.6	**58.3**	2.9	4.9	5.5
Greenhouse Effect							
		A	B	C	D		
23. Which of the following do you think is the main 'greenhouse gas'?	B	27	**681**	97	12	72	74
		2.8	**70.7**	10.1	1.2	7.5	7.7
24. Do the following activities increase or decrease the amount of these gases in the atmosphere?		A(increase)		B(decrease)			
a) Burning oil or coal for fuel	A	**773**		66		42	82
		80.3		6.9		4.4	8.5
b) Planting trees and forests	B	93		**759**		26	85
		9.7		**78.8**		2.7	8.8
c) Making and using CFCs	A	**423**		103		342	95
		43.9		10.7		35.5	9.9
d) Using alternative energy sources such as solar power and wind	B	150		**608**		113	92
		15.6		**63.1**		11.7	9.6
e) Using motor cars	A	**709**		102		58	94
		73.6		10.6		6.0	9.8

Table IV.8Summary of responses of 9th grade students to the knowledge questions

9th grade participants' responses to the knowledge questions (n=963)

Items regarding environmental knowledge	Correct Answer	Frequency (*f*) and Percentage (%) A	B	C	Other	I don't know	Missing
Acid Rain							
4. What do you think acid rain is?	A	**811**	713	14	5	28	50
		50.0	44.0	0.9	0.3	1.7	3.1
5. How do you think acid rain is produced?	A	**1207**	306	19	7	35	47
		74.5	18.9	1.2	0.4	2.2	2.9
6. What are the consequences of acid rain to human beings and environment?	A	**1138**	112	261	20	40	50
		70.2	6.9	16.1	1.2	2.5	3.1
		City	Village	Both			
7. Do you think that the acid rain appears in the city, in the village or in both of them?	Both	555	41	**973**			52
		34.2	2.5	**60.0**			3.2
Ozone Depletion							
14. What do you think the ozone layer does?	B	181	**1236**	31	56	36	81
		11.2	**76.2**	1.9	3.5	2.2	5.0
15. The most effective gas which causes ozone layer destruction is	B	924	**337**	81	13	163	107
		57.0	**20.8**	5.0	0.8	10.1	6.4
16. If the ozone layer problem becomes worse,	C	78	421	**936**	43	46	97
		4.8	26.0	**57.7**	2.7	2.8	6.0
Greenhouse Effect							
		A	B	C	D		
23. Which of the following do you think is the main 'greenhouse gas'?	B	71	**1081**	138	32	156	143
		4.4	**66.7**	8.5	2.0	9.6	8.8
24. Do the following activities increase or decrease the amount of these gases in the atmosphere?		A(increase)		B(decrease)			
a) Burning oil or coal for fuel	A	**1249**		131		106	135
		77.1		8.1		6.5	8.3
b) Planting trees and forests	B	160		**1244**		76	141
		9.9		**76.7**		4.7	8.7
c) Making and using CFCs	A	**620**		163		682	156
		38.2		10.1		42.1	9.6
d) Using alternative energy sources such as solar power and wind	B	208		**1027**		226	160
		12.8		**63.4**		13.9	9.9
e) Using motor cars	A	**1170**		157		127	167
		72.2		9.7		7.8	10.3

The results in Table IV.7 and Table IV.8 indicate that almost three fifth of grade 8 students (57.9%, n=558) answered the question of "what do you think acid rain is?" correctly (item-4). However, 405 (42.1%) of grade 8 students either answered wrongly or could not answer the question (Table IV.6). The responses of 9th grade students on item-4 were quite different. Only 50.0% (n=811) of the students answered the question correctly. The other 50.0% students' selection distribution was as follows: "contaminated rain which contains dirty gases and harmful substances" 44.0% (n=713), "rain which contains mud" 0.9% (n=14), "other" 0.3% (n=5), "I don't know" 1.7% (n=28) and "missing" 3.1% (n=50) (Table 4.8 and appendix E/F). Considering the responses of item-5, 69.8 % of grade 8 students knew how acid rain is produced and chose "air pollutants which combine with water in the atmosphere to produce acids" and 23.9% of 8th grade students chose the second alternative which was "car exhaust fumes which combine with the rain". In contrast to grade 8 participants, 74.5% of grade 9 students chose the correct answer and only 18.9% of grade 9 students chose "car exhaust fumes which combine with the rain" as an answer. 75.4% of grade 8 students (n=726) and 70.2% (n=1138) of grade 9 students knew the consequences of acid rain to human beings and the environment (item-6), 10.9% (n=105) of grade 8 participants and 16.1% (n=261) of grade 9 participants had knowledge about the consequences of acid rain as disastrous to human beings since it causes several diseases. 8.7% (n=84) of grade 8 participants and 6.9% (n=112) of grade 9 participants had knowledge about the consequences of acid rain as contaminating the environment and the microbes causing people's deaths. 415 (43.1%) of grade 8 students and 555 (34.2%) of grade 9 students knew that acid rain appears only in the city. However, the number of correctly answered responses from 8th and 9th grade students were higher with 52.2% (n=503) and 60.0% (n=973) respectively (Table IV.7, Table IV.8, see Appendices C/D and E/F).

Responses to the items related to ozone depletion knowledge were as follows: 771 (80.1%) grade 8 students and 1236 (76.2%) grade 9 students correctly answered item-14 which asked about the role of ozone layer by selecting the "ozone layer protects the world from harmful ultraviolet rays" option. 87 (9.0%) of 8th grade and 181 (11.2%) of 9th grade students selected the choice of "ozone layer protects the world from toxic gases". The results indicate that only 27.1% (n=261) of grade 8 students and only 20.8% (n=337) of grade 9 students answered the item-15 correctly which was "chlorofluorocarbon (CFC)", while 72.9% (n=702) of 8th grade and 57.0% (n=924) of 9th grade students failed to either give a correct answer to the question related to the gases causing ozone layer destruction or could not answer. 58.3% (n=561) of 8th grade and 57.7% (n=936) of 9th grade students responded correctly to the item-16 which asked about the consequences of ozone hole on human beings. Distribution of other choices were: "more air pollution" with 23.6% (n=227) and 26.0% (n=421), "more water pollution" with 4.9 % (n=47) and 4.8% (n=78), "I don't know" with 4.9% (n=47) and 2.8% (n=46), "other" with 2.9% (n=28) and 2.7% (n=43), and "missing" 5.5% (n=53) and 6.0% (n=97) respectively (Table IV.7, Table IV.8, see Appendices C/D and E/F).

70.7% (n=681) of grade 8 and 66.7% (n=1081) grade 9 students correctly answered the question of "Which of the following do you think is the main 'greenhouse gas'?" by choosing the "carbon dioxide" option. 10.1% (n=97) of 8th grade and 8.5% (n=138) of 9th grade students chose "nitrogen". 2.8% (n=27) of 8th grade and 4.4% (n=71) of 9th grade students chose "oxygen" as their answers. Item-24 a, b, c and d results indicated that burning oil or coal for fuel (grade 8: 80.3%, n=773; grade 9: 77.1%, n=1249; item-24a), making and using CFCs (grade 8: 43.9%,n=423; grade 9: 38.2%, n=620; item24c), and using motor cars (grade 8: 73.6%, n=709; grade 9: 72.2%, n=1170; item-24e) were correctly chosen as increasing activities. On the other hand, planting trees and forests (grade 8: 78.8%, n=759; grade 9: 76.7%, n= 1244; item-24b) and using alternative energy sources such as solar power and wind (grade 8: 63.1%, n=608; grade 9: 63.4%, n=1027; item-24d) were correctly chosen as decreasing activities. However, 8th and 9th grade students' second highest responses to the item-24c were "I don't know" with 35.5% (n=342) and 42.1% (n=682) respectively (Table IV.7, Table IV.8, see Appendices C/D and E/F).

In addition, the chi-square analysis (see Appendix R Table 1) reveals that students' correct answers to the knowledge measuring questions also varies according to the respondent's characteristics (demographic variables, region, and school).

When environmental knowledge measuring items were categorized according to the number of questions answered correctly and classified as adequate, moderate, and inadequate accordingly, the following results were obtained (Table IV.9).

Table IV.9 Environmental knowledge levels of 8th and 9th grade students

Number of correctly answered questions	Number of respondents	Percentage of respondents	Level of respondent
8th Grade	***(n=963)***		
12-13	109	11.3%	Adequate
10-11	254	26.4%	Adequate
7-9	375	38.9%	Moderate
4-6	160	16.6%	Inadequate
0-3	65	6.7%	Inadequate
9th Grade	***(n=1621)***		
12-13	144	8.9%	Adequate
10-11	424	26.2%	Adequate
7-9	626	38.6%	Moderate
4-6	278	17.1%	Inadequate
0-3	149	9.2%	Inadequate

As the results in Table IV.9 indicate, 37.7% (11.3% + 26.4%) of 8th grade and 35.1% (8.9% + 26.2%) of 9th grade students possess high levels of environmental knowledge while 76.6% (11.3% + 26.4% + 38.9%) of 8th grade and 73.7% (8.9% + 26.2% + 38.6%) of 9th grade students possess acceptable levels of environmental knowledge on this categorization. Another significant point is that 23.3% (16.6% + 6.7%) of 8th grade and 26.3% (17.1% + 9.2%) of 9th grade participants of this study could not get adequate results from the environmental knowledge level measuring items of the students' questionnaires (C8EKAQ and C9EKAQ).

4.2.1.2.1 Actions to Reduce Damages of Batteries

Only 1355 (83.6%) grade 9 participants responded to the item-35. The results (Table IV.10) indicate that only 54.5% (n=883) of participants were using rechargeable batteries and only 48.7% (48.7) of participants properly disposed the non-rechargeable batteries for recycling to reduce environmental effect of batteries. 73.5% (n=1191) of participants, to protect the environment and reduce damages from batteries, do not dispose battery in fire and 73.2% (n=1186) of participants do not use mercury batteries. On the other hand, 472 (29.1%) of the participants were using rechargeable batteries and 566 (34.9%) of the participants were not considering recycling of non-rechargeable batteries to reduce environmental damages from batteries. Further, 164 (10.1%) of participants thought that throwing batteries in fire reduced their damages and 169 (10.4%) of the participants responded that they were using mercury batteries to reduce environmental damages from batteries.

Table IV.10 Grade 9 students' actions to reduce environmental damages from batteries

Q35. Which one of the following actions do you think may reduce environmental damages from batteries?

		No	Yes	Total	Missing/skipped	Total
Use rechargeable batteries	Frequency	472	**883**	1355	266	1621
	Percent	29.1	**54.5**	83.6	16.4	100.0
Dispose of a battery in a fire	Frequency	**1191**	164	1355	266	1621
	Percent	**73.5**	10.1	83.6	16.4	100.0
Use mercury batteries	Frequency	**1186**	169	1355	266	1621
	Percent	**73.2**	10.4	83.6	16.4	100.0
Recycle your non-rechargeable batteries	Frequency	566	**789**	1355	266	1621
	Percent	34.9	**48.7**	83.6	16.4	100.0

4.2.1.3 Personal Importance of Environmental Issues

4.2.1.3.1 Personal importance of Acid Rain

Most of the 8th grade respondents (85.2%) and 9th grade respondents (83.9%) consider the issue (Table IV.11) to be personally important (grade 8 and grade 9: mean scores = 1.63 and 1.62 respectively, on a 4-point scale).

Table IV.11 Personal importance of acid rain

Q8. How important is the issue of acid rain to you personally?

	8th Grade			**9th Grade**		
	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent
Very important	510	53.0	55.1	898	55.4	58.0
Quite important	279	29.0	30.1	401	24.7	25.9
Not very important	103	10.7	11.1	188	11.6	12.1
Not at all important	34	3.5	3.7	62	3.8	4.0
Total	926	96.2	100.0	1549	95.6	100.0
missing/skipped	37	3.8		72	4.4	
Total	**963**	**100.0**		**1621**	**100.0**	

Chi-square analysis was used to explore relationships between variables. This analysis determines whether different types of respondents (e.g., boy and girl) gave significantly different survey responses. Chi-square determines that there is a significant relationship between variables but it does not determine just how significant and important this is. Therefore, it is used alongside the Cramer's V' statistic, which measures the strength of the relationship. Cramer's V is a post-test to give this additional information. Cramer's V varies between 0 and 1: *0.06 to 0.10 weak relationship, 0.11 to 0.15 moderate relationship, 0.15 to 0.25 strong relationship, and 0.25 or higher very strong relationship*. Close to 0 it shows little association between variables. Close to 1, it indicates a strong association.

Chi-square analyses indicate that, of the 55.1 % of grade 8 respondents who stated they consider acid rain to be personally 'very important' (Table IV.11), significantly higher proportions are:

- Those who had done projects in lessons (27.9%) (Cramer's V=0.117, $p<0.01$)
- Those who had done experiments (10.0%) (Cramer's V=0.104, $p<0.05$)
- Those who attended cleaning programs (56.3%) (Cramer's V=0.167, $p<0.01$)
- Those who attended discussion programs (37.1%) (Cramer's V=0.108, $p<0.05$)

Chi-square analyses indicate that, of the 58.0 % of grade 9 respondents who stated they consider acid rain to be personally 'very important' (Table IV.11), significantly higher proportions are:

- Chemistry Subject (46.8%) (Cramer's V=0.113, $p<0.01$)
- Those who had done projects in lessons (23.5%) (Cramer's V=0.119, $p<0.01$)
- Those who attended cleaning programs (51.6%) (Cramer's V=0.145, $p<0.01$)
- Those who attended talks with experts (14.8%) (Cramer's V=0.096, $p<0.01$)

4.2.1.3.2 Personal importance of Ozone Depletion

Most of the 8th grade respondents (91.0%) and 9th grade respondents (84.5%) consider the issue (Table IV.12) to be personally important (grade 8 and grade 9: mean scores = 1.48 and 1.51 respectively, on a 4-point scale).

Table IV.12 Personal importance of ozone depletion

Q17. How important is the issue of ozone depletion to you personally?

	8th Grade			**9th Grade**		
	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent
Very important	566	58.8	62.7	942	58.1	61.9
Quite important	256	26.6	28.3	428	26.4	28.1
Not very important	62	6.4	6.9	107	6.6	7.0
Not at all important	19	2.0	2.1	44	2.7	2.9
Total	903	93.8	100.0	1521	93.8	100.0
missing/skipped	60	6.2		100	6.2	
Total	**963**	**100.0**		**1621**	**100.0**	

Chi-square analyses indicate that, of the 58.1 % grade 9 respondents who stated they consider ozone depletion to be personally 'very important' (Table IV.12), significantly higher proportions are:

- Textbook (33.2%) (Cramer's V=0.076, $p<0.05$)
- Teacher (53.8%) (Cramer's V=0.117, $p<0.01$)
- Those who had done experiments (14.9%) (Cramer's V=0.114, $p<0.01$)
- Those who had attended essay competition (11.3%) (Cramer's V=0.116, $p<0.01$)
- Those who attended discussion programs (42.9%) (Cramer's V=0.133, $p<0.01$)
- Those who attended environmental trips (45.9%) (Cramer's V=0.088, $p<0.05$)
- Those who had done project in lessons (31.3%) (Cramer's V=0.113, $p<0.01$)
- Those who attended cleaning programs (54.8%) (Cramer's V=0.196, $p<0.01$)
- Those who attended talks with experts (11.9%) (Cramer's V=0.116, $p<0.01$)

4.2.1.3.3 Personal importance of Greenhouse Effect

Most of the 8th grade respondents (87.4%) and 9th grade respondents (78.0%) consider the issue (Table IV.13) to be personally important (grade 8 and grade 9: mean scores = 1.58 and 1.59 respectively, on a 4-point scale).

Chi-square analyses indicate that, of the 57.7% grade 8 respondents who stated they consider greenhouse effect to be personally 'very important' (Table IV.13), significantly higher proportion is:

- Teacher (52.9%) (Cramer's V=0.165, $p<0.01$)

Chi-square analyses indicate that, of the 50.4% grade 9 respondents who stated they consider greenhouse effect to be personally 'very important' (Table IV.13), significantly higher proportions are:

- Chemistry Subject (41.4%) (Cramer's V=0.123, $p<0.01$)
- Teacher (50.3%) (Cramer's V=0.130, $p<0.01$)

- Those who used extra materials (19.0%) (Cramer's V=0.089, $p<0.05$)
- Those who attended discussion programs (40.8%) (Cramer's V=0.160, $p<0.01$)
- Those who attended environmental trips (42.0%) (Cramer's V=0.113, $p<0.01$)
- Those who had done projects in lessons (15.2%) (Cramer's V=0.081, $p<0.05$)
- Those who attended cleaning programs (50.0%) (Cramer's V=0.226, $p<0.01$)
- Those who attended talks with experts (10.9%) (Cramer's V=0.090, $p<0.05$)
- Those who attended school environmental projects (27.2%) (Cramer's V=0.156, $p<0.01$)

Table IV.13 Personal importance of greenhouse effect

Q25. How important is the issue of greenhouse effect to you personally?

	8th Grade			9th Grade		
	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent
Very important	491	51.0	57.7	817	50.4	56.4
Quite important	253	26.3	29.7	448	27.6	30.9
Not very important	78	8.1	9.2	144	8.9	9.9
Not at all important	29	3.0	3.4	40	2.5	2.8
Total	851	88.4	100.0	1449	89.4	100.0
missing/skipped	112	11.6		172	10.6	
Total	**963**	**100.0**		**1621**	**100.0**	

In addition, the results of Chi-square analysis indicated that chemistry subject were not significantly higher predictor of 8th and 9th grade respondents who stated they consider environmental issues to be personally 'very important'. Only it was significantly higher predictor of 9th grade respondents who stated that they considering acid rain and greenhouse effect to be personally 'very important'.

4.2.2 Students' Source of Knowledge on Environmental Issues

4.2.2.1 Source of Acid Rain

The C8EKAQ and C9EKAQ data indicate that school is a source of information for 37.7% and 38.2% of survey respondents (grade 8 and 9 students), internet for 15.6%

and 15.0%, books for 17.7% and 14.8%, and television/radio for 9.6% and 11.0% respectively (Table IV.14).

Table IV.14 Student participants' information sources: acid rain

Q9. How have you learned what is "acid rain"?

	Responses (grade 8)		Percent of Cases	Responses (grade 9)		Percent of Cases
	N	Percent		N	Percent	
Television/Radio	235	9.6%	24.7%	440	11.0%	27.8%
Friends/Family	127	5.2%	13.4%	193	4.8%	12.2%
Taught at school	924	37.7%	97.2%	1525	38.2%	96.3%
Internet	382	15.6%	40.2%	600	15.0%	37.9%
Newspapers	43	1.8%	4.5%	98	2.5%	6.2%
Conferences/Seminars	12	0.5%	1.3%	32	0.8%	2.0%
Magazines/Journals	89	3.6%	9.4%	145	3.6%	9.2%
Social Media	79	3.2%	8.3%	172	4.3%	10.9%
Books	433	17.7%	45.5%	591	14.8%	37.3%
Environmental Groups	127	5.2%	13.4%	200	5.0%	12.6%
Total	2451	100.0%	257.7%	3996	100.0%	252.6%

4.2.2.2 Source of Ozone Depletion

The C8EKAQ and C9EKAQ data indicate that school is a source of information for 34.4% and 35.2% of survey respondents (grade 8 and 9 students), internet for 16.5% and 17.4%, books for 15.0% and 12.4%, and television/radio for 13.8% and 13.5% respectively (Table IV.15).

Table IV.15 Student participants' information sources: ozone depletion

Q18. Where have you heard about Ozone Depletion?

	Responses (grade 8)		Percent of Cases	Responses (grade 9)		Percent of Cases
	N	Percent		N	Percent	
Television/Radio	339	13.8%	36.8%	552	13.5%	35.8%
Friends/Family	148	6.0%	16.1%	201	4.9%	13.1%
Taught at school	845	34.4%	91.6%	1439	35.2%	93.4%
Internet	404	16.5%	43.8%	711	17.4%	46.2%
Newspapers	57	2.3%	6.2%	134	3.3%	8.7%
Conferences/Seminars	10	0.4%	1.1%	44	1.1%	2.9%
Magazines/Journals	105	4.3%	11.4%	177	4.3%	11.5%
Social Media	89	3.6%	9.7%	181	4.4%	11.8%
Books	369	15.0%	40.0%	507	12.4%	32.9%
Environmental Groups	87	3.5%	9.4%	144	3.5%	9.4%
Total	2453	100.0%	266.1%	4090	100.0%	265.6%

4.2.2.3 Source of Greenhouse Effect

The Table IV.16 results indicate that the source of information is higher for those taught at school (grade 8: 37.3%; grade 9: 34.3%), for internet (grade 8: 16.7%; grade 9: 17.1%), for books (grade 8: 14.7%; grade 9: 12.0%), and for television/radio (grade 8: 12.0%; grade 9: 14.1%).

Table IV.16 Student participants' information sources: greenhouse effect

Q26. How have you learned what "greenhouse effect" is?

	Responses (grade 8)		Percent of Cases	Responses (grade 9)		Percent of Cases
	N	Percent		N	Percent	
Television/Radio	274	12.0%	30.6%	578	14.1%	38.6%
Friends/Family	131	5.7%	14.7%	244	6.0%	16.3%
Taught at school	852	37.3%	95.3%	1406	34.3%	94.0%
Internet	382	16.7%	42.7%	699	17.1%	46.7%
Newspapers	67	2.9%	7.5%	156	3.8%	10.4%
Conferences/Seminars	13	0.6%	1.5%	47	1.1%	3.1%
Magazines/Journals	81	3.5%	9.1%	178	4.3%	11.9%
Social Media	78	3.4%	8.7%	190	4.6%	12.7%
Books	336	14.7%	37.6%	493	12.0%	33.0%
Environmental Groups	70	3.1%	7.8%	107	2.6%	7.2%
Total	2284	100.0%	255.5%	4098	100.0%	273.9%

4.2.2.4 Source of Environmental Damages from Batteries

The results of Table IV.17 indicate that among the grade 9 students' responses, the most rated information source is school (36.8%), followed by internet (17.3%), television/radio (13.5%) and books (10.2%).

Table IV.17 Student participants' information sources: damages from batteries

Q31. How were you informed about the harmful effects of batteries to the environment?

	Responses (grade 9)		Percent of Cases
	N	Percent	
Television/Radio	464	13.5%	33.1%
Friends/Family	237	6.9%	16.9%
Taught at school	1262	36.8%	90.0%
Internet	592	17.3%	42.2%

Newspapers	139	4.1%	9.9%
Conferences/Seminars	37	1.1%	2.6%
Magazines/Journals	121	3.5%	8.6%
Social Media	151	4.4%	10.8%
Books	348	10.2%	24.8%
Environmental Groups	75	2.2%	5.3%
Total	3426	100.0%	244.2%

4.2.3 Influencing School Subjects

First three highest response percentages of 8th grade and 9th grade students to the item-11 which was "I have heard about acid rain in the ……. lesson" are chemistry (40.0%), biology (32.1%), geography (17.1%), biology (36.3%); and chemistry (36.1%) and geography (16.4%) respectively. (see Appendix R, Table 2 and Table 3).

Response percentages to the item-20 which was "I have heard about Ozone Depletion in the …… lesson" are as follows: Biology (35.4%), chemistry (31.0%), and geography (19.9%) marked the three highest 8th grade students' responses. 9th grade students' response percentages to the item-20 are chemistry (34.7%), biology (33.0%), and physics (14.8%) (see Appendix R, Table 4 and Table 5).

Table 6 and Table 7 results (see Appendix R) indicate the response percentages of 8th grade and 9th grade students to the item-28 which was "I have heard about greenhouse effect in the ……. lesson" as biology (35.3%), chemistry (30.0%), and geography (20.4%) and biology (34.1%), chemistry (32.6%), and geography (15.8%). And, Table 8 (see Appendix R) shows that the highest response percentages to the item-30 (I have heard about "Why batteries are harmful to the environment?" in the …. lesson) was 46.7% (chemistry), second highest 24.0% (physics) and third highest 21.2% (biology).

Table 9 (see Appendix R) results indicated that Natural science and English subjects were also mentioned by 8^{th} grade respondents. 9^{th} grade respondents also indicated Natural science and English subjects. However, the respondent frequencies of Natural science and English subjects varied between 0.1% - 2.0% which was very low. The green pack tool kit mentioned as a subject by the 9^{th} grade respondents related to the ozone depletion (23 respondents) and greenhouse effect (3 respondents).

4.2.4 Influencing Chemistry Lesson

Table 10 (see Appendix R) results indicate that 741 (76.9%) grade 8 students heard about acid rain in chemistry lessons, 480 (49.8%) grade 8 students heard about ozone depletion in chemistry lessons, and 492 (51.1%) grade 8 students also heard about the greenhouse effect in chemistry lessons. Out of 1621 9^{th} grade participants, 1146 (70.7%) of respondents heard about acid rain in chemistry lesson, 1023 (63.1%) of respondents heard about ozone depletion in chemistry lesson, 946 (58.4%) of respondents heard about greenhouse effect in chemistry lesson, and 980 (60.5%) of respondents heard about environmental damages from batteries in chemistry lesson (see Table 11 in appendix R).

In addition, the chi-square analysis (see Table IV.18) reveals that the ‘heard in chemistry lesson’ responses of 8^{th} and 9^{th} grade students to the Q11, Q20, Q28, and Q33 (only grade 9) varied according to the variables influencing the acquisition on environmental issues. The chi-square significance level and influencing variables were as follows:

- Textbook variable found to be significant (<.05) influencing 8^{th} grade students’ –heard about ozone depletion in chemistry lesson- response and found to be significant (<.05 or <.01) influencing 9^{th} grade students’ - heard about ozone depletion/damages of batteries in chemistry lesson- responses.

- Teacher variable found to be significant (<.01) influencing 8th grade students' - heard about ozone depletion in chemistry lesson- response and found to be significant (<.01) influencing 9th grade students' - heard about acid rain/ozone depletion/greenhouse effect/damages of batteries in chemistry lesson- responses.
- Having reading/learning materials found to be significant (<.01) influencing 8th grade students' -heard about ozone depletion/greenhouse effect in chemistry lesson- responses and found to be significant (<.01) influencing 9th grade students' -heard about acid rain/ozone depletion/greenhouse effect in chemistry lesson- responses.
- Doing project found to be significant (<.01 or <.05) influencing 8th grade students' -heard about acid rain/greenhouse effect in chemistry lesson- responses and found to be significant (<.01) influencing 9th grade students' -heard about acid rain/ozone depletion/greenhouse effect/damages of batteries in chemistry lesson- responses.
- It was found that doing experiments was significant (<.05) and influencing 8th grade students' - heard about acid rain in chemistry lesson- response.
- Using visual materials (video/slide/presentation) influenced significantly (<.01) 9th grade students' -heard about ozone depletion in chemistry lesson- response.
- There was no association between organizing seminars/ talks by experts and "heard in chemistry lesson" responses of 8th and 9th grade students.
- There was significant (<.05) influence between attending trip/outdoor activity and 8th grade students' -heard about acid rain in chemistry lesson- response and attending trip/outdoor activity found to be significant (<.01) and influencing 9th grade students' -heard about damages of batteries in chemistry lesson- response.

Table IV.18 Chi-square significance level: comparing chemistry lesson with variables influencing the acquisition on environmental issues

	Acid Rain		Ozone Depletion		Greenhouse Effect		Damages of Batteries	
	Grade 8	Grade 9	Grade 8	Grade 9	Grade 8	Grade 9	Grade 8	Grade 9
Textbook		<.05	<.05					<.01
Teacher		<.01	<.01	<.01		<.01		<.01
Reading/learning materials		<.01	<.01	<.01	<.01	<.01		<.01
Project	<.01	<.01		<.01	<.05	<.01		<.01
Experiment	<.05							
Using video/slide/ppt.				<.01				
seminar/talk by experts								
trip/outdoor activity	<.05							<.01

4.2.5 Effect of Chemistry Teacher on Students' Environmental Knowledge and Awareness

4.2.5.1 Students' Perspective: Effect of Teachers and their Used Methodology / Pedagogical Approaches

The response of 8th grade students to questions on how they learned about acid rain (Q12), ozone depletion (Q21), and greenhouse effect (Q29) in the lessons were as follows: 770 out of 915 respondents, which was 84.2% response rate, said that "the teacher" explained acid rain during the lesson. For ozone depletion it was 722 out of 829 respondents, which was 87.1% response rate, and for greenhouse effect it was 710 out of 822 respondents, which was 86.4% response rate. Among other responses, "Teacher explained" was the highest with 39.2% of acid rain responses, 45.2% of ozone depletion responses, and 42.3% of greenhouse effect responses (see Appendix R, Table 12, Table 14, and Table 16).

The responses of 9th grade students to questions on how they learned about acid rain (Q12), ozone depletion (Q21), greenhouse effect (Q29), and damages of batteries

(Q34) in the lessons were as follows: 1248 out of 1501 respondents, which was 83.1% response rate, said that “the teacher” explained acid rain during the lesson. For ozone depletion it was 1171 out of 1424 respondents, which was 82.2% response rate, for greenhouse effect it was 1133 out of 1357 respondents, which was 83.5% response rate, and for damages of batteries it was 1000 out of 1243 respondents, which was 80.5% response rate. Among other responses, “Teacher explained” was the highest with 39.7% of acid rain responses, 40.7% of ozone depletion responses, 38.6% of greenhouse effect responses, and 38.9% damages of batteries responses (see Appendix R, Table 13, Table 15, Table 17 and Table 18). Above, students’ ‘teacher explained’ response percentages are high but their influences on students’ environmental knowledge level were found low (see Table IV.9). The reason might be most of the teachers were using teacher-centered approach instead of student-centered approach.

The 8th grade and 9th grade students’ responses predicted that most of the teachers used only the lecture method (teacher-centered learning) while teaching acid rain topic in their lessons. Table 19 and Table 22 (see Appendix R) results indicate that only 181 (23.5%) 8th grade students out of 770 and 398 (31.9%) 9th grade students out of 1248 were given extra reading and learning materials. In addition, only 359 (46.6%) 8th grade and 475 (38.0%) 9th grade students said that they were given projects, 43 (5.6%) 8th grade and 44 (3.5%) 9th grade students said that they had done experiments and only 27 (3.5%) 8th grade and 90 (7.2%) 9th grade students said that their teacher used visual materials while teaching acid rain in class. The Table 20 and Table 23 (see Appendix R) results indicate that out of the 722 8th grade and 1171 9th grade students who said that the teacher explained the ozone depletion, only 182 (25.2%) 8th grade and 360 (30.7%) 9th grade students were given extra learning and reading materials by the teacher while only 102 (14.1%) 8th grade and 255 (21.8%) 9th grade students had done projects. The students' responses also indicate that their teachers had not done experiments as only 16 out of the 722 grade 8 students said 'yes' and 39 out of 1171 grade 9 students said 'yes'. Visual materials were also not used while teaching ozone depletion as only 24 out of 722 grade 8 students said 'yes' and only 89 out of 1171 grade 9 students said 'yes'. As mentioned before (see Appendix R Table 16 and Table 17), 710 8th grade and 1133 9th grade students responded that their teachers explained the green house effect and they learned. Out of 710 8th grade and out of 1133 9th grade students, only 175 (24.6%) 8th grade and 373 (32.9%) 9th grade students said that their teacher gave extra reading and learning materials, only 139 (19.6%) 8th grade and 291 (25.7%) 9th grade students had done a project, and most of the 8th and 9th grade students responded that their teachers had not done an experiment (97.1% and 95.4% responses respectively) or had not shown video, slide, or TV program (96.9% and 93.1% responses respectively) related to the greenhouse effect (see Appendix R Table 21 and Table 24). Table 25 (see Appendix R) results indicate that only 305 (30.5%) 9th grade students out of 1000 were given extra reading and learning materials, only 211 (21.1%) 9th grade students said that they were given projects, only 66 (6.6%) 9th grade students said they had done an experiment, and only 67 (6.7%) 9th grade students said that their teacher used visual materials while teaching environmental damages of batteries in the class.

4.2.5.2 Teachers' Perspective: Teachers' Used Methodology/Pedagogical Approaches to Teach Environmental Topics During the Lesson

The Table IV.19 results indicated that in almost every lesson, the used strategies by chemistry teachers were as follows: 39.0% of chemistry teachers were using "discussion" and 58.5% of chemistry teachers were using "problem solving/critical thinking". However, "never" used teaching/learning strategies were "role playing" with

51.2%, "field trip/outdoor activities" with 41.5%, and using "Video/TV programmes/Slides" with 31.7%.

The Table IV.19 results also indicated that the "lecture" strategy was not preferred in every lesson. Only 14.6% of chemistry teachers mentioned that they used the "lecture" strategy in every chemistry lesson. If responses of "about half of the lessons" and "every or almost every lesson" are combined, the mostly used teaching/learning strategies are: "problem solving/critical thinking" with 78.0%, "discussion" with 73.1%, and "lecture" with 46.3%. In "some lessons" used teaching/learning strategies and respondent percentages are as follows: 90.2% of chemistry teachers said that they used games/competitions, 82.9% of chemistry teachers used independent or group projects, 73.2% of chemistry teachers used experiments, and 68.3% of chemistry teachers used computer-assisted learning activities.

Table IV.19 Q4 Frequencies: Teaching/learning strategies of chemistry teachers

In teaching chemistry to the students, how often do you use the following teaching/learning strategies?

		Never	Some Lessons	About Half of the Lessons	Every or Almost Every Lesson
Field trips/ outdoor activities	Frequency	17	17	-	-
	Percent	41.5%	41.5%	-	-
Lectures	Frequency	3	11	13	6
	Percent	7.3%	26.8%	31.7%	14.6%
Experiments	Frequency	3	30	6	1
	Percent	7.3%	73.2%	14.6%	2.4%
Independent or group projects	Frequency		34	1	3
	Percent		82.9%	2.4%	7.3%
Computer-assisted learning activities	Frequency	5	28	7	-
	Percent	12.2%	68.3%	17.1%	-
Role-playing	Frequency	21	13	1	-
	Percent	51.2%	31.7%	2.4%	-
Games/competitions	Frequency	1	37	1	1
	Percent	2.4%	90.2%	2.4%	2.4%
Video/TV programmes/Slides	Frequency	13	20	5	-
	Percent	31.7%	48.8%	12.2%	-
Discussion	Frequency	1	10	14	16
	Percent	2.4%	24.4%	34.1%	39.0%
Problem solving/critical thinking	Frequency	-	9	8	24
	Percent	-	22.0%	19.5%	58.5%

Using Table IV.19 data, it was predicted that student-centered teaching such as discussion and problem solving/critical thinking were used instead of teacher-centered teaching such as lecture while teaching chemistry. And also, it was predicted that active teaching/learning strategies such as field trip/outdoor activities, experiments, role-playing, games/competitions and independent or group projects were not preferred strategies in half of the lessons or every lesson.

Table IV.20 Chemistry teachers' teaching/learning strategies to teach environmental topics

Frequencies: How do you teach these environmental issues in Class ……?

	Class 8 (Q15)		Class 9 (Q20)	
	Frequency (n=41)	Percent (100%)	Frequency (n=41)	Percent (100%)
Field trips/ outdoor activities	9	22.2%	7	17.0%
Lectures	18	43.9%	13	31.7%
Experiments	6	14.6%	6	14.6%
Independent or group projects	9	22.0%	18	43.9%
Computer-assisted learning activities	11	26.8%	11	26.8%
Games/Competitions	1	2.4%	-	-
Video/TV programmes/Slides	7	17.1%	6	14.6%
Discussion	13	31.7%	13	31.7%
Problem solving/critical thinking	1	2.4%	2	4.9%

Table IV.20 results indicated that chemistry teachers used different teaching/learning strategies while teaching environmental topics in contrast to used teaching/learning strategies while teaching chemistry (see Table IV.19).

In class 8, the mostly preferred teaching/learning strategy was "lectures" with 43.9%, followed by "discussion" with 31.7% and "computer-assisted learning activities" with 26.8% (see also Appendix W). In class 9, the mostly used teaching/learning strategy was "independent or group projects" with 43.9% followed by "lectures" and "discussion" with 31.7% each (Table IV.20) (see also Appendix W). Chemistry teachers did not use problem solving/critical thinking strategy to teach environmental topics even though it was highly preferred strategy while teaching chemistry in both classes. May be teachers were found content of environmental issues not suitable to use problem solving method but critical thinking strategy should be implemented.

4.2.5.3 Teachers' Content Knowledge Level

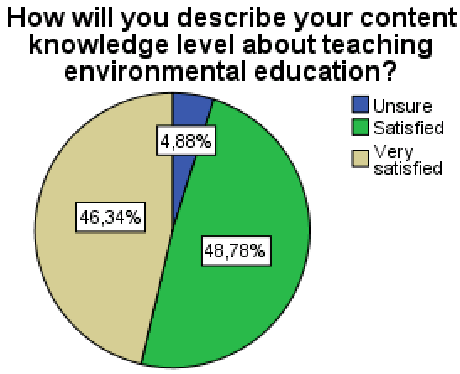

Figure IV.1 Chemistry teachers' environmental content knowledge self-evaluation

Almost 95.0% of chemistry teachers described their content knowledge level as satisfactory and very satisfactory (Figure IV.1). Most of the chemistry teachers (92.7%) indicated that their information source was internet (Table IV.2) (see 4.1.1.4.2). It was significant that all of the participants said "quite important" and "very important" to the question 5 which asked about chemistry teachers' personal concern on environmental issues (Figure IV.2).

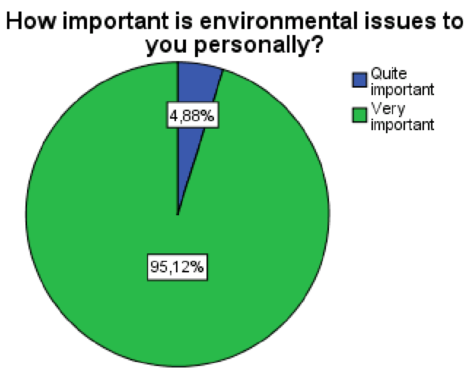

Figure IV.2 Chemistry teachers' self-evaluation: personal concern about environmental issues

Table IV.21 results indicated that most of the chemistry teachers agreed that the 8th and 9th grade chemistry topics were helpful in teaching the best known global environmental problems such as acid rain (90.2% of respondents), water pollution (85.4% of respondents), air pollution (75.6% of respondents), ozone depletion (75.6% of respondents), global warming (73.2% of respondents), greenhouse effect (73.2% of respondents), and chemical pollution (73.2% of respondents). The chemistry teachers taught these environmental topics while teaching chemistry (see Appendix R Table 26).

Table IV.21 Chemistry teachers' responses: Effect of chemistry topics on teaching environmental issues

Q9 Frequencies: Class 8 and class 9 chemistry topics are helpful in the following environmental issues.

	Responses		Percentage of Cases
	N	Percent	
Acid rain	37	12.3%	90.2%
Water pollution	35	11.6%	85.4%
Air pollution	31	10.3%	75.6%
Ozone layer depletion	31	10.3%	75.6%
Global warming	30	9.9%	73.2%
Greenhouse effect	30	9.9%	73.2%
Chemical pollution	30	9.9%	73.2%
Soil pollution	23	7.6%	56.1%
Recycling	16	5.3%	39.0%
Deforestation	13	4.3%	31.7%
Loss of biodiversity	13	4.3%	31.7%
Noise pollution	10	3.3%	24.4%
Population	3	1.0%	7.3%
Total	302	100.0%	736.6%

a. Dichotomy group tabulated at value 1 (yes).

Higher responses had environmental issues which were taught in class 8 as acid rain (54.1%), air pollution (45.9%), water pollution (32.4%), and greenhouse effect (32.4%) (Table IV.22)(see also Appendix U). In class 9, the most taught environmental issue was chemical pollution with 48.6%, followed by air pollution (25.7%) and ozone layer depletion (25.7%) (see Appendix R Table 27 and Appendix U).

Table IV.22 Teachers' responses to Q13: Taught environmental issues in class 8

Frequencies: Which environmental issues do you teach in class 8?

		Responses [a]		Percent of Cases [b]
		N	Percent	
Valid	Acid rain	20	18.3%	54.1%
	Air pollution	17	15.6%	45.9%
	Water pollution	12	11.0%	32.4%
	Greenhouse effect	12	11.0%	32.4%
	Chemical pollution	10	9.2%	27.0%
	Global warming	9	8.3%	24.3%
	Ozone layer depletion	9	8.3%	24.3%
	Loss of biodiversity	6	5.5%	16.2%
	Land Pollution	5	4.6%	13.5%
	Recycling	4	3.7%	10.8%
	Soil pollution	3	2.8%	8.1%
	Disposal of Battery	1	0.9%	2.7%
	Deforestation	1	0.9%	2.7%
Total		109	100.0%	294.6%

a. Dichotomy group tabulated at value 1(yes).
b. Valid N=37, missing N=4.

In summary, the results indicated that (Figure IV.1, Figure IV.2, Table IV.21, Table IV.22, Table 26, and Table 27):

- Most of the chemistry teachers agreed that the chemistry topics which were taught in class 8 and 9 are helpful in the teaching of environmental issues while teaching chemistry.
- Most of the chemistry teachers' content knowledge level to teach environmental problems and their awareness level on environmental issues were found to be adequate.
- The chemistry teachers were using their content knowledge to teach environmental issues while teaching chemistry in their classes.

In addition to the afore-mentioned predictions, chemistry teachers' awareness level was found to be very high. Their responses to the item-6 "One of my teaching goals of chemistry is to increase the students' level of environmental responsibility" were as follows: "agree" and "strongly agree" totaled 100.0% and there was zero response to the "strongly disagree", "disagree", and "neutral"(see Appendix R Table 28).

Table IV.23 results indicated that 77.8% of respondents taught the causes of environmental issues but teaching of consequences and how to minimize environmental problems (cure) were not adequate, with levels of 41.7% and 44.4% respectively (see also Appendix V). However, the results for class 9 were significantly different. 75.0% of the chemistry teachers taught the consequences of environmental issues but only 38.9% of chemistry teachers explained the causes and only 47.2% of chemistry teachers explained the cure (Table IV.24) (see also Appendix V). That's why environmental knowledge level of students were found not adequate and their environmental knowledge score were low (see Table IV.6 and Table IV.9).

Table IV.23 Frequencies of Q14: What do you teach in class 8? /cause, consequences, and cure.

		Responses [a]		Percent of Cases [b]
		N	Percent	
Valid	cause	28	47.5%	77.8%
	consequences	15	25.4%	41.7%
	cure	16	27.1%	44.4%
Total		59	100.0%	163.9%

a. Dichotomy group tabulated at value 1.
b. Valid N=36, missing N=5.

Table IV.24 Frequencies of Q19: What do you teach in class 9? /cause, consequences, and cure.

		Responses [a]		Percent of Cases [b]
		N	Percent	
Valid	cause	14	24.1%	38.9%
	consequences	27	46.6%	75.0%
	cure	17	29.3%	47.2%
Total		58	100.0%	161.1%

a. Dichotomy group tabulated at value 1.
b. Valid N=36, missing N=5.

More supportive results to the afore-mentioned predictions were obtained from Table 29, Table 30, and Table 31 (see Appendix R). 76.5% of chemistry teachers said that preparation time is not a problem to teaching environmental issues, 80.0% of chemistry teachers believe that they have adequate content knowledge to teach environmental issues to the students, and 77.1% of chemistry teachers agreed that the contents of 8^{th} and 9^{th} grade chemistry subjects were relevant to teaching environmental issues.

The chemistry teachers were asked what could be done to improve the awareness of students (see Appendix G/H TEKAISQ, Q26). It was significant that the highest response percentage (74.4%) indicated the "Training the teachers" (see Appendix R Table 32) even though almost 95% (Figure IV.1) of the chemistry teachers accepted that their competence levels were adequate to teach environmental issues.

A Chi-square test is really a descriptive test, related to a correlation (It was used alongside the Cramer's V statistic in this study). It's not a modeling technique, so there is no dependent variable. In order to describe the strength of a relationship or to model the determinants of and predict the likelihood of an outcome regression analysis was used.

4.2.6 Inferential Analysis: Examining Chemistry Teachers' Content Knowledge as Predictor of Students' Environmental knowledge and awareness.

4.2.6.1 Binary Logistic Regression

4.2.6.1.1 Procedure: Coding of Variables

In order to determine the influence of chemistry teachers' content knowledge on students' environmental knowledge and awareness, an appropriate measure of "knowledge and awareness" first had to be identified. A number of dimensions of respondents' environmental knowledge and awareness were included in the binary logistic regression analysis.

- The first dependent variable examined those respondents who stated in question 5 (see Appendices C/D and E/F), that ‘air pollutants combine with water in the atmosphere and produce acids’. Since this is accepted among scientists as the main cause of acid rain it was felt to represent “knowledge and awareness”. The responses to this question were converted to dichotomous variables and the response that ‘air pollutants combine with the water in the atmosphere and produce acids’, was assigned a value of one (1), whereas all other responses, a value of zero (0).
- The second dependent variable examined those respondents who stated in question 15 (see Appendices C/D and E/F), ‘the most effective gas which causes ozone layer destruction is chlorofluorocarbon (CFC)’. Since this is accepted among scientists as the main cause of ozone depletion it was felt to represent “knowledge and awareness”. The responses to this question were converted to dichotomous variables and the response, ‘chlorofluorocarbon (CFC)’, was assigned a value of one (1), whereas all other responses, a value of zero (0).
- The third dependent variable examined those respondents who stated in question 16 (see Appendices C/D and E/F), ‘if the ozone layer problem becomes worse, more people will get skin cancer’. Since this is accepted among scientists as the main consequence of ozone depletion it was felt to represent “knowledge and awareness”. The responses to this question were converted to dichotomous variables and the response, ‘more people will get skin cancer’, was assigned a value of one (1), whereas all other responses, a value of zero (0).
- The fourth dependent variable examined those respondents who stated in

question 23 (see Appendices C/D and E/F) that the main 'greenhouse gas' is carbon dioxide'. Since this is accepted among scientists as the main cause of greenhouse effect it was felt to represent "knowledge and awareness". The responses to this question were converted to dichotomous variables and the response, 'carbon dioxide', was assigned a value of one (1), whereas all other responses, a value of zero (0).

- The fifth dependent variable examined those respondents (only grade 9) who stated in question 35 (see Appendix E/F), 'which actions do you think may reduce environmental damages of batteries'. Here, one (1) indicates two or more correct responses; zero (0) indicates less than two correct responses.
- The sixth dependent variable examined those respondents who stated in question 32/38 (see Appendices C/D and E/F), 'who do you think should have the main responsibility for tackling environmental problems?'. The answer 'individuals' is determined by the researcher as a predictor of students' environmental awareness. The responses to this question were converted to dichotomous variables and the response, 'individuals', was assigned a value of one (1), whereas all other responses, a value of zero (0).

The independent variables included in the regression analyses are:

- subjects (chemistry, history, physics, biology, and geography)
- ways to learn (textbook, teacher explained, extra reading/learning materials, project, experiment, visual documents, seminar/talk by experts, and outdoor activities).

4.2.6.1.2 Results and Data Analyses

Acid rain: Conditional logistic regression was conducted to determine which independent variables (ways to learn: textbook, teacher explained, extra reading/learning materials, project, experiment, visual documents, seminar/talk by experts, and outdoor activities) were predictors of acid rain knowledge (Q5: How acid rain is produced, answered correctly "1" or wrongly "0"). Regression results indicate the overall model of two predictors (teacher explained and experiment) was statistically reliable in distinguishing between knowing acid rain ($\chi 2$= 8.593, p<.05) (Table IV.25). The model correctly classified 60.7% of the cases (Table IV.26). Regression coefficients are presented in Table IV.27. Wald statistics indicated that teacher (p<.05, Exp(B)=.682) and doing experiments (p<.05, Exp(B)=.536) significantly predict knowledge of acid rain.

Table IV.25 Logistic regression chi-square: grade 8 acid rain knowledge as dependent variable (DV) and ways to learn (Q12) as independent variables (IVs)

Omnibus Tests of Model Coefficients

Grade 8		Chi-square	df	Sig.
Step 2	Step	4.042	1	.044
	Block	8.593	2	.014
	Model	8.593	2	.014

Table IV.26 Logistic regression selected cases: grade 8 acid rain knowledge (DV) and ways to learn (Q12-IVs)

Classification Table[a]

Grade 8 Observed			Predicted: How do you think acid is rain produced? No	Predicted: How do you think acid is rain produced? Yes	Percentage Correct
Step 2	How do you think acid rain is produced?	No	28	340	7.6
		Yes	15	521	97.2
	Overall Percentage				60.7

a. The cut value is .500

Table IV.27 Logistic regression Wald statistics: grade 8 acid rain knowledge (DV) and ways to learn (Q12-IVs)

Variables in the Equation

Grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	acidrainQ12teach	-.382	.193	3.934	1	.047	.682
	acidrainQ12exp	-.623	.281	4.916	1	.027	.536
	Constant	.739	.180	16.899	1	.000	2.093

a. Variable(s) entered on step 2: acidrainQ12teach.

Conditional logistic regression was conducted to determine which independent variables (subjects: chemistry, history, physics, biology, and geography) were predictors of acid rain knowledge (Q5: How acid rain is produced, answered correctly "1" or wrongly "0"). Regression results indicate the overall model of two predictors (chemistry explained and geography) was statistically reliable in distinguishing between knowing acid rain ($\chi2$= 20.734, p<.01) (Table IV.28). The model correctly classified 59.0% of the cases (Table IV.29). Regression coefficients are presented in Table IV.30. Wald statistics indicated that chemistry subject (p<.01, Exp(B)=.601) significantly predict knowledge of acid rain.

Table IV.28 Logistic regression chi-square: grade 8 acid rain knowledge (DV) and subjects (Q11-IVs)

Omnibus Tests of Model Coefficients

Grade 8		Chi-square	df	Sig.
Step 2	Step	8.064	1	.005
	Block	20.734	2	.000
	Model	20.734	2	.000

Table IV.29 Logistic regression selected cases: grade 8 acid rain knowledge (DV) and subjects (Q11-IVs)

Classification Table[a]

Grade 8 Observed			Predicted: How do you think acid rain is produced? No	Predicted: How do you think acid rain is produced? Yes	Percentage Correct
Step 2	How do you think acid rain is produced?	No	131	238	35.5
		Yes	132	402	75.3
	Overall Percentage				59.0

a. The cut value is .500

Table IV.30 Logistic regression Wald statistics: grade 8 acid rain knowledge (DV) and subjects (Q11-IVs)

Variables in the Equation

Grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	acidrainQ11chem	-.509	.182	7.773	1	.005	.601
	Constant	.959	.172	30.918	1	.000	2.608

a. Variable(s) entered on step 2: acidrainQ11chem.

Further logistic regression analysis, between acid rain knowledge (dependent variable) and teacher explained (independent variable) in chemistry lesson (selection variable-SV) was conducted. The level of significance was found to be less than 0.05 (Table IV.31). The null hypothesis that there is no relationship between 8th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was rejected. Table IV.31 results also indicated that there was significant ($p<.05$) relation between doing experiments in chemistry lesson and acid rain knowledge.

Table IV.31 Regression results: cause[b] (Q5) of acid rain (DV) and ways to learn (Q12-IV) in chemistry[c] lesson (Q11-SV)

	Grade 8	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	teacher explained	-.417	.213	3.827	1	.050	.659
	done experiment	-.599	.294	4.148	1	.042	.549
	constant	.665	.199	11.232	1	.001	1.945

a. Variable(s) entered on step 1
b. Dependent Variable: How do you think acid rain is produced?
c. Selecting only cases for which I have heard about acid rain in the chemistry lesson = Yes

A logistic regression analysis, between acid rain knowledge (dependent variable) and teacher explained (independent variable) was conducted. The level of significance was found to be higher than 0.05 (Table IV.32). The null hypothesis that there is no relationship between 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was not rejected.

Table IV.32 Logistic regression Wald statistics: grade 9 acid rain knowledge (DV) and ways to learn (Q12-IVs)

Variables in the Equation[bc]

Grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12teach	.185	.163	1.292	1	.256	1.203
	Constant	.967	.173	31.361	1	.000	2.631

a. Variable(s) entered on step 1: acidrainQ12teach.
b. $\chi 2=31.342$, $p<.0001$
c. selected case 77.8%

Ozone depletion: Logistic regression analysis between ozone depletion knowledge-cause- (Q15: The most effective gas which causes ozone layer destruction) as dependent variable and teacher explained (independent variable) was conducted. The level of significance was found to be higher than 0.05 (Table IV.33 and Table IV.34). The null hypothesis that there is no relationship between 8th and 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was not rejected.

Table IV.33 Logistic regression Wald statistics: grade 8 ozone depletion knowledge-cause-Q15 (DV) and teacher explained (Q21-IV)

Variables in the Equation[b]

Grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	teacher explained	.155	.243	.404	1	.525	1.167
	Constant	-.946	.258	13.426	1	.000	.388

a. Variable(s) entered on step 1: ozonQ21txt, ozonQ21tea, ozonQ21read, ozonQ21pro, ozonQ21exp, ozonQ21show, ozonQ21sem, ozonQ21trip.
b. selected case 70.8%

Table IV.34 Logistic regression Wald statistics: grade 9 ozone depletion knowledge-cause-Q15 (DV) and teacher explained (Q21-IV)

Variables in the Equation[b]

Grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	teacher explained	.127	.175	.531	1	.466	1.136
	Constant	-1.643	.187	77.133	1	.000	.193

a. Variable(s) entered on step 1: ozonQ21txt, ozonQ21tea, ozonQ21read, ozonQ21pro, ozonQ21exp, ozonQ21show, ozonQ21sem, ozonQ21trip.
b. selected case 77.3%

A logistic regression analysis (Table IV.35 and Table IV.36), between ozone depletion knowledge-consequences- (DV) and teacher explained (IV) in chemistry lesson (SV) was conducted. Regression results indicate the overall model of teacher explained was statistically reliable in distinguishing between knowing consequences of ozone depletion (grade 8: $\chi 2= 23.428$, $p<.001$; grade 9: $\chi 2= 82.028$, $p<.001$). The models correctly classified 62.8% of the cases (grade 8) and 65.0% of the cases (grade 9). Wald statistics indicated that teacher (grade 8: $p<.001$, Exp(B)= 3.052; grade 9: $p<.001$, Exp(B)= 2.107) significantly predict knowledge of ozone depletion consequences. One unit increase in teacher explained increased the odds that 8th grade and 9th grade survey respondents have more knowledge about consequences of ozone depletion by approximately three times (Exp(B)= 3.052) and by approximately two times (Exp(B)= 2.107). The null hypothesis that there is no relationship between 8th and 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was rejected.

Table IV.35 Regression results of grade 8: consequences[b] (Q16) of ozone depletion (DV) and teacher explained (Q21-IV) in chemistry[c] lesson (Q20-SV)

Grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	teacher explained	1.116	.318	12.276	1	.000	3.052
	constant	-.658	.305	4.642	1	.031	.518

a. Variable(s) entered on step 1
b. Dependent Variable: If the ozone layer problem becomes worse
c. Selecting only cases for which I have heard about ozone depletion in the chemistry lesson = Yes
d. $\chi 2=23.428$, $p<.001$
e. selected case 62.8 %

Table IV.36 Regression results of grade 9 : consequences[b] (Q16) of ozone depletion (DV) and teacher explained (Q21-IV) in chemistry[c] lesson (Q20-SV)

Grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	teacher explained	.745	.189	15.488	1	.000	2.107
	constant	-.667	.202	10.863	1	.001	.513

a. Variable(s) entered on step 1
b. Dependent Variable: If the ozone layer problem becomes worse
c. Selecting only cases for which I have heard about ozone depletion in the chemistry lesson = Yes
d. $\chi 2$=82.028, p<.001
e. selected case 65.0 %

Greenhouse effect: Logistic regression analysis between greenhouse effect knowledge-cause- (Q23: Which of the following do you think is the main 'greenhouse gas'?) as dependent variable and teacher explained (IV) was conducted. The level of significance was found to be higher than 0.05 (Table IV.37). The null hypothesis that there is no relationship between 8th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was not rejected.

Table IV.37 Logistic regression Wald statistics: grade 8 greenhouse effect knowledge-cause-Q23 (DV) and teacher explained (Q29-IV)

Variables in the Equation[b]

Grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	teacher explained	-.027	.350	.006	1	.939	.973
	Constant	1.277	.377	11.442	1	.001	3.586

a. Variable(s) entered on step 1: greenQ29txt, greenQ29tea, greenQ29read, greenQ29pro, greenQ29exp, greenQ29show, greenQ29sem, greenQ29trip.
b. selected case 70.8%

Using 9th grade survey results, logistic regression analysis (Table IV.38) between greenhouse effect knowledge-cause- (DV) and teacher explained (IV) in chemistry lesson (SV) was conducted. Regression results indicate the overall model of teacher explained was statistically reliable in distinguishing between knowing what causes greenhouse effect ($\chi 2$= 35.518, p<.001). The models correctly classified 76.5% of the cases. Wald statistics indicated that a teacher (p<.001, Exp(B)= 2.425) significantly predicts knowledge of which gas causes the greenhouse effect. One unit increase in teacher explained increased the odds that 9th grade survey respondents have more knowledge about what causes greenhouse effect by approximately two and half times (Exp(B)= 2.425). The null hypothesis that there is no relationship between 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was rejected.

Table IV.38 Regression results of grade 9: what causes[b] (Q23) greenhouse effect (DV) and teacher explained (Q29-IV) in chemistry[c] lesson (Q28-SV)

Grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	teacher explained	.886	.230	14.855	1	.000	2.425
	constant	.060	.243	.062	1	.804	1.062

a. Variable(s) entered on step 1
b. Dependent Variable: Which of the following do you think is the main 'greenhouse gas'?
c. Selecting only cases for which I have heard about ozone depletion in the chemistry lesson = Yes
d. $\chi 2$=35.518, p<.001
e. selected case 76.5 %

Damages of batteries: Logistic regression analysis between actions to reduce environmental damages of batteries -cure- (Q35) as dependent variable and ways of learning (IVs) in chemistry lesson (SV) was conducted. The level of significance (teacher explained) was found higher than 0.05 (Table IV.39). The null hypothesis that there is no relationship between 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge was not rejected.

Table IV.39 Regression results of grade 9: actions (cure[b]) (Q35) to reduce environmental damages of batteries (DV) and teacher explained (Q34-IV) in chemistry[c] lesson (Q33-SV)

Variables in the Equation

Grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	batQ34txt	.330	.242	1.860	1	.173	1.391
	batQ34tea	.475	.299	2.529	1	.112	1.608
	batQ34read	-.446	.251	3.170	1	.075	.640
	batQ34pro	1.153	.366	9.938	1	.002	3.168
	batQ34exp	.095	.441	.046	1	.830	1.099
	batQ34show	-1.254	.381	10.834	1	.001	.285
	batQ34act	-.681	.590	1.331	1	.249	.506
	Constant	1.872	.323	33.687	1	.000	6.501

a. Variable(s) entered on step 1: batQ34txt, batQ34tea, batQ34read, batQ34pro, batQ34exp, batQ34show, batQ34act.
b. Dependent Variable: Which one of the following actions do you think may reduce environmental damages of batteries
c. Selecting only cases for which I have heard about "Why are batteries harmful to the environment?" in the chemistry lesson = Yes
d. $\chi 2=28.745$, $p<.001$
e. selected case 91.4 %

The summary of logistic regression results (Table IV.40) indicated that when only teacher-centered approaches were used, content knowledge level of chemistry teachers was effective on ½ (50%) of the selected dependent variables which represented 8th grade students' environmental knowledge and was effective on only two fifth of the selected dependent variables which represented 9th grade students' environmental knowledge.

Table IV.40 Summary of regression results: Teacher- centered approach (teacher explained) and students' environmental knowledge

Environmental issues	Grade 8	Grade 9
Acid rain (cause)	<.05	>.05
Ozone (cause)	>.05	>.05
Ozone (consequences)	<.01	<.01
Greenhouse effect (cause)	>.05	<.01
Damages of batteries	**-**	**>.05**

However, when not only teacher-centered approach (teacher explained) but also student-centered approaches (project, experiment) were used together by chemistry teachers while teaching selected environmental issues., Table IV.41 results indicated that the effect of teachers' content knowledge on 8th grade students' environmental knowledge level was significantly increased to 4/4 (100%) and increased to three fifth on 9th grade students.

Table IV.41 Summary of regression results: Student-centered approach (teacher explained, done project, and done experiment) and students' environmental knowledge

Environmental issues	Grade 8[a]	Grade 9[b]
Acid rain (cause)	<.05	>.05
Ozone (cause)	<.05	>.05
Ozone (consequences)	<.01	<.01
Greenhouse effect (cause)	<.05	<.01
Damages of batteries	**-**	**<.01**

a. See Appendix R Table 33
b. See Appendix R Table 34

Logistic regression was conducted to determine 'teacher explained' as independent variable predictor and 9th grade students' environmental awareness as dependent variable. Regression results (Table IV.42) indicate content knowledge of teachers while teaching environmental issues was statistically reliable ($p<.05$) on 9th grade students' environmental awareness. Wald statistics indicated that the variable 'teacher explained' significantly predicts 9th grade students' environmental awareness. Odds ratios (Exp(B)) for teacher explained indicate by 1.5 times (average of four Exp(B) values) change on the 9th grade students' environmental awareness level.

Table IV.42 Logistic regression Wald statistics: grade 9 students' awareness (Q38-DV) and teacher explained (IV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12teach	.290	.147	3.891	1	.049	1.337
	Constant	-.163	.135	1.456	1	.228	.850

a. Variable(s) entered on step 1: acidrainQ12teach.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozoneQ21tea	.537	.150	12.820	1	.000	1.711
	Constant	-.341	.137	6.191	1	.013	.711

a. Variable(s) entered on step 1: ozonQ21tea.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	greenQ29tea	.552	.157	12.376	1	.000	1.737
	Constant	-.376	.144	6.799	1	.009	.686

a. Variable(s) entered on step 1: greenQ29tea.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	batQ34tea	.305	.150	4.160	1	.041	1.357
	Constant	-.189	.135	1.972	1	.160	.828

a. Variable(s) entered on step 1: batQ34tea.

However, chemistry teachers' content knowledge was statistically reliable ($p<.01$) on 9th grade students' environmental awareness while teaching only ozone depletion and greenhouse effect. Odds ratios indicate by approximately 2 times change on the 9th grade students' environmental awareness (Table IV.43).

Table IV.43 Logistic regression Wald statistics: grade 9 students' awareness (Q38-DV) and teacher explained (IV) in chemistry lesson (SV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12teach	.228	.181	1.585	1	.208	1.256
	Constant	-.085	.168	.253	1	.615	.919

a. Variable(s) entered on step 1: acidrainQ12teach.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozoneQ21tea	.750	.192	15.350	1	.000	2.118
	Constant	-.542	.178	9.299	1	.002	.581

a. Variable(s) entered on step 1: ozonQ21tea.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	greenQ29tea	.605	.228	7.023	1	.008	1.830
	Constant	-.452	.216	4.370	1	.037	.636

a. Variable(s) entered on step 1: greenQ29tea.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	batQ34tea	.008	.184	.002	1	.967	1.008
	Constant	.185	.169	1.195	1	.274	1.203

a. Variable(s) entered on step 1: batQ34tea.

Logistic regression was conducted to determine 'teacher explained' as an independent variable predictor and 8th grade students' environmental awareness as dependent variable. Regression results (see Appendix R Table 35) indicate content knowledge of teachers while teaching environmental issues (only ozone depletion and greenhouse effect) was statistically reliable ($p<.01$) on 8th grade students' environmental awareness. Wald statistics indicated that the variable teacher explained significantly predicts 8th grade students' environmental awareness. Odds ratios (Exp(B)) for teacher explained indicate by 1.8 times (average of four Exp(B) values) change on the 8th grade students' environmental awareness level. However, chemistry teachers' content knowledge was statistically reliable ($p<.05$) on 8th grade students' environmental awareness while teaching only greenhouse effect. Odds ratios indicate by 1.7 times change on the 8th grade students' environmental awareness (see Appendix R Table 36). The null hypothesis that there is no relationship between 8th and 9th grade students' environmental awareness and chemistry teachers' environmental knowledge was rejected.

4.3 Effect of Chemistry Curricula on Students' Environmental Knowledge and Awareness

The second research question in this study was "What is the influence level of chemistry curriculum content on environmental knowledge and awareness of 8th and 9th grade students?". To answer this question, the following null hypothesis was tested:

"There are no significant differences on students' environmental knowledge and awareness if 8th and 9th grade chemistry curriculum includes environmental contents."

4.3.1 Descriptive Results: Chemistry Teachers' Responses

The chemistry teachers were asked "do you think class 8 and class 9 chemistry contents are effective?" The results indicate that only 4 (9.8%) teachers said that the current chemistry curricula are very effective, 30 (73.2%) chemistry teachers said chemistry curricula are somewhat effective and 7 (17.1%) chemistry teachers said the curricula were not very effective (Table IV.44). It was predicted that chemistry teachers found chemistry curricula not very adequate and 51.2 % of chemistry teachers responded that the chemistry curricula needed to be improved to increase students' environmental awareness level (Table IV.45).

Table IV.44 Chemistry teachers' response frequencies to "Do you think class 8 and class 9 chemistry curricula contents are effective?"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not very effective	7	17.1	17.1	17.1
	somewhat effective	30	73.2	73.2	90.2
	Very effective	4	9.8	9.8	100.0
	Total	41	100.0	100.0	

Table IV.45 Chemistry teachers' response frequencies to "What could be done to improve environmental awareness?" with response "development of curriculum"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	20	48.8	48.8	48.8
	Yes	21	51.2	51.2	100.0
	Total	41	100.0	100.0	

4.3.2 Content Analysis Results: Curricula and Textbooks

8th grade chemistry curriculum environmental issues related objectives are:

- show negative effects of acids to the atmosphere
- describe acid rain and what causes it, global effects of acid rain
- discuss environmental problems associated with acid rain
- show environmental effects of compounds of elements S, N, P, and C.

The afore-mentioned objectives in Albanian (original) are as follows:

- Të tregojnë veprime negative të acideve në atmosferë;
- Të përshkruajnë shirat acide, burimet dhe efektet globale të shirave acide;
- Të diskutojnë problemet mjedisore që lidhen me shiun acid.
- Të tregojnë ndikime të përbërjeve të S, N, P, C mbi mjedisin (IZHA, 2006).

9th grade chemistry curriculum environmental issues related objectives are:

- to explain environmental pollution caused by batteries

- to discuss polycyclic arenes (such as naphthalene, anthracene, and fenantren) as environmental pollutants
- to describe the use of certain halogenated hydrocarbons such as DDT and its environmental impacts;
- to write impact of chlorofluorocarbons (CFCs) in the thinning of the ozone layer;
- to discuss the environmental impact of detergents

The afore-mentioned objectives in Albanian (original) are as follows:

- Të shpjegojnë ndotjen e mjedisit nga bateritë;
- Të diskutojnë disa përfaqsues kryesorë të areneve policiklike (si për shembull naftalenin, antracenin, fenantrenin) si ndotësa të mjedisit;
- Të përshkruajnë përdorime të disa hidrokarbureve të halogjenuar si linden, DDT dhe ndikimet në mjedis;
- Të përshkruajnç ndikimin e klorofluorokarboneve (CFC) në hollimin e shtresës së ozonit;
- Të diskutojnë ndikimin në mjedis të detergjenteve; (IZHA, 2007).

In the 8^{th} grade curriculum, environmental issues were integrated as multidisciplinary to contribute environmental education and also targeted to teach environmental topics as tasks such as experiments which give students opportunity to synthesis and link learned content to the daily life problems including environmental problems (IZHA, 2006).

> "Integrimi sipas problemeve. Bëhet fjalë këtu për një grup problemesh jetësore akoma të pazgjidhura nga shoqëria si p.sh problemet e edukimit mjedisor, shëndetësor, etj të cilat, nuk mund të shqyrtohen nga një disiplinë më vete por kërkojnë trajtime nga disa disiplina bashkë, secila në këndvështrimet e saj. Programi i kimisë 8, p.sh përmban disa objektiva që lidhen me mjedisin kërkohet që kimia të japë këndvështrimin e vet shkencor për shiun acid, ndotjet kimike etj duke sjellë kështu kontributin e vet në trajtimin e problemeve mjedisore."(IZHA, 2006, p.12)

"Pyetjet e sintezës. Në përgjigjen e këtyre pyetjeve nxënësit duhet të renditin përmbajtjen e mësuar më parë për të krijuar një produkt të ri. Në përgjithësi, ato shtrohen si detyra, p.sh.: «Gjej në laboratorin e kimisë substancat: oksid bariumi, sulfat hekuri tre valent, ujë, acid sulfurik, oksid bakri dy valent. Duke përdorur këto substanca zhvillo reaksione që të përftosh ; a) dy kripëra të reja b) dy baza të reja c) dy okside bazike të reja ». Pyetjet sintezë zakonisht nuk kanë vetëm një përgjigje të saktë. Ato mund të jenë disa. Ndër mënyrat e hartimit të pyetjeve sintezë është dhe ajo e lidhjes së përmbajtjes së mësimit me probleme të jetës së përditshme që lidhen me mësimin, p.sh., në kimi mund të përfshihen mjaft mirë problemet mjedisore të shirave acide, ndotjeve të tokës, ujit etj."(IZHA, 2006, p.16)

Learning objectives of 9th grade chemistry curriculum targeted to cover study of substances and their processes in connection with life and environment. To the 9th class chemistry curriculum, unsolved problems such as environmental education were integrated as multidisciplinary. The curriculum contains several objectives related to the environmental problems such as ozone depletion and chemical pollution to contribute to environmental education (IZHA, 2007).

"Programi i klasës së nëntë, përmes një tërësie objektivash mësimore që përcakton vendos në qendër të tij studimin e substancave dhe proceseve në lidhjen e tyre të ngushtë me jetën dhe mjedisin. Kurrikula duhet të pasqyrojë në thellësinë dhe gjerësinë e mjaftueshme këto kërkesa."(IZHA, 2007, p.3)

"Integrimi sipas problemeve. Bëhet fjalë këtu për një grup problemesh jetësore akoma të pazgjidhura nga shoqëria njerëzore, komuniteti si p.sh problemet e edukimit mjedisor, shëndetësor, edukimit për paqen, etj të cilat nuk mund të shqyrtohen nga një disiplinë më vete, por kërkojnë trajtime nga disa disiplina bashkë secila në këndvështrimet e saj."(IZHA, 2007, p.15)

"Programi i kimisë 9 përmban disa objektiva që lidhen me mjedisin dhe kërkohet që kimia të japë këndvështrimin e vet shkencor, për shembull për hollimin e shtresës së ozonit, ndotjet kimike etj, duke sjellë kështu kontributin e vet në trajtimin e problemeve mjedisore."(IZHA, 2007, p.16)

There were 61 objectives in the 8th grade chemistry curriculum and only 4 (6.5%) were related to some of the environmental issues such as acid rain (explicit), chemical pollution (implicit), land pollution (implicit), air pollution (implicit), and greenhouse effect (implicit). In 9th grade chemistry curriculum, there were 148 objectives and only 5 (3.4%) were related to the environmental issues such as ozone depletion (explicit), chemical pollution (explicit) and environmental damages of batteries (explicit) (see Appendix R Table 37).

However, the Table 37 results indicate that the civic education curriculum included the highest percentage (25%) of environmental objectives among 8th grade curricula and the geography curriculum included the highest percentage (23.4%) of environmental objectives among 9th grade curricula.

Teachers and textbook publishers use the curriculum as a primary source or as a guiding document. The curriculum is effective on students' environmental knowledge and awareness indirectly. The students may get information about environmental problems, if chemistry textbooks reflect the curriculum objectives (including integrated environmental objectives) or if chemistry teachers integrate environmental objectives of curriculum to their yearly plans, daily plans, and teaching topics.

Textbooks can be a valuable indicator to analyze the effect of the chemistry curriculum on students' environmental knowledge and awareness. Officially approved 14 grade 8 and 14 grade 9 textbooks including chemistry, history, physics, geography, biology, civic education, and Albanian language were scrutinized. It was investigated how many and which environmental topics were included, and in which subjects and grades these topics were meant to be taught (see Appendix R Table 38 and Table 39).

It was cross-checked whether the environmental topics presented in textbooks (see Appendix R Table 38 and Table 39) were actually part of the curriculum (see Appendix R Table 37). The following results were found significant:

- Biology curriculum integrated loss of biodiversity. However, Mediaprint biology 8 which had the highest vote (78%; 1331 out of 1581 biology teachers) did not include loss of biodiversity. On the other hand the lowest voted (12%; 192 teachers) Albas biology 8 included it.
- Neither the 9th grade biology curriculum nor the biology textbooks included

environmental objectives/topics.

- 8th grade civic education textbook (Albas) was prepared with integrated environmental objectives of 8th grade civic education curriculum. 9th grade curriculum and textbook (Albas) did not include environmental related objectives/topics.
- 8th and 9th grade physics curricula' objectives and 8th and 9th grade examined textbooks' topics matched in terms of selected environmental objectives/topics
- 8th grade examined geography textbook integrated the environmental objectives of 8th grade geography curriculum in its contents. However, it there were some missing environmental objectives related contents in the 9th grade examined geography textbook
- 9th grade examined Albanian language textbook integrated environmental objectives of 9th grade Albanian language curriculum to its contents. However, there was no environmental content in the 8th grade examined Albanian language textbook although its curriculum had environmental objectives.
- Between the contents of 8th and 9th grade examined history textbooks and their curricula environmental objectives parallel results were established.
- Five chemistry 8 textbooks were examined. Only Mediaprint chemistry textbook (313 teachers' vote; 20%) integrated all environmental objectives of the curriculum.
- Three chemistry 9 textbooks were examined. Only Albas chemistry textbook (353 teachers' vote; 23%) integrated all environmental objectives of the curriculum.

4.3.3 Inferential Analysis: Examining Chemistry Curriculum as Predictor of Students' Environmental Awareness

In order to determine the effect of chemistry curriculum on 8th and 9th grade students' environmental awareness, first the SPSS data of C8EKAQ and SPSS data of C9EKAQ data were combined to analyze the effect of chemistry curricula on 8^{tt} and 9th grade students' environmental awareness. Secondly, question 32/38 (see Appendices C/D and E/F), 'who do you think should have the main responsibility of tackling environmental problems?'. The answer 'individuals' is determined by the researcher as a predictor of students' environmental awareness. The responses to this question were converted to dichotomous variables and the response, 'individuals', was assigned a value of one (1), whereas all other responses, a value of zero (0). The independent variables included in the logistic regression analyses were:

- ways to learn (textbook) as independent variable
- chemistry as selective variable

Using 8th and 9th grade combined survey results, logistic regression analysis between students' awareness (Q32/Q38) as dependent variable (DV) and read in the textbook (Q12/Q21/Q29/Q34) as independent variable (IV) in chemistry lesson (Q11/Q20/Q29/Q33) as selection variable (SV) was conducted. Regression results indicate the overall model of read in the textbook as statistically reliable in distinguishing between students' environmental awareness (acid: $\chi2= 8.746$, $p<.01$; ozone: $\chi2= 34.427$, $p<.001$; greenhouse: $\chi2= 32.790$, $p<.001$; battery: $\chi2= 13.009$, $p<.01$) (Table IV.46). The models correctly classified 54.2%, 57.0%, 58.3%, and 57.5% of the cases (acid, ozone, greenhouse, and battery respectively) (Table IV.47). Wald statistics indicated that read in the textbook (acid: $p<.01$, Exp(B)= 1.332; ozone: $p<.001$, Exp(B)= 1.503; greenhouse: p<.001, Exp(B)= 1.522; battery: p<.01, Exp(B)= 1.455) (Table IV.48) significantly predict students' environmental awareness. One unit increase in read in the textbook increased the odds that 8th and 9th grade survey respondents have more awareness on environmental issues by approximately one and a half times (average Exp(B)= 1.453). The null hypothesis that there are no significant differences on students' environmental awareness if 8th and 9th grade chemistry curriculum include environmental contents was rejected.

Table IV.46 Logistic regression chi-square: 8th and 9th grade students' awareness (Q32/Q38-DV) and textbook (Q12/Q21/Q29/Q34-IV) in Chemistry (Q11/Q20/Q29/Q33-SV)

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Acid rain model	8.746	1	.003
	Ozone depletion model	34.427	4	.000
	Greenhouse effect model	32.790	3	.000
	Battery effect model	13.009	2	.001

Table IV.47 Logistic regression selected cases: 8th and 9th grade students' awareness (Q32/Q38-DV) and textbook (Q12/Q21/Q29/Q34-IV) in Chemistry (Q11/Q20/Q29/Q33-SV)

Classification Table[a]

Observed		Selected Cases[b] (Yes)	Percentage Correct
Step 1	Acid rain (Yes)	947	54.2
	Ozone depletion (Yes)	685	57.0
	Greenhouse effect (Yes)	476	58.3
	Battery effect (Yes)	366	57.5

a. The cut value is .500
b. Selected cases I have heard about acid rain/ozone depletion/greenhouse effect/effect of batteries in the chemistry lesson EQ 1

Table IV.48 Logistic regression Wald statistics: 8th and 9th grade students' awareness (Q32/Q38-DV) and textbook (Q12/Q21/Q29/Q34-IV) in Chemistry (Q11/Q20/Q29/Q33-SV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12textbook	.287	.097	8.715	1	.003	1.332
	Constant	.043	.064	.455	1	.500	1.044

a. Variable(s) entered on step 1: acidrainQ12text.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 4[a]	ozoneQ21textbook	.408	.109	13.990	1	.000	1.503
	Constant	-.715	.167	18.310	1	.000	.489

a. Variable(s) entered on step 4: greenQ29exp.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 3[a]	greenQ29textbook	.420	.113	13.784	1	.000	1.522
	Constant	-.699	.179	15.261	1	.000	.497

a. Variable(s) entered on step 3: greenQ29pro.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	batQ34textbook	.375	.137	7.524	1	.006	1.455
	Constant	-.116	.111	1.097	1	.295	.890

a. Variable(s) entered on step 2: batQ34pro.

4.4 Effect of Using Environmental Knowledge Integrated into Instructional Materials on 8th and 9th Grade Students' Environmental Knowledge and Awareness

The third research question in this study was "What are the effects of instructional materials for chemistry lessons on environmental knowledge and awareness of 8th and 9th grade students?". To answer this question, the following null hypothesis was tested:

"There is no positive effect on 8th and 9th grade students' environmental knowledge and awareness if environmental knowledge is integrated to the instructional materials."

The chemistry teachers were asked, "Do you think the class 8 and class 9 textbooks have satisfactory content related to the environmental concepts and problems indicated in the chemistry curricula?". The results indicate that 27 (65.8%) teachers thought the current chemistry textbooks have adequate environmental concepts, 6 (14.6%) chemistry teachers were unsure and 8 (19.5%) chemistry teachers said the current chemistry textbooks have inadequate environmental concepts (see Appendix R

Table 40). 22 chemistry teachers indicated that textbooks needed to be improved if students' environmental awareness level was to be increased (see Appendix R Table 41). It was significant that 12 teachers who found chemistry textbooks adequate also said that the textbooks needed to be improved (see Appendix R Table 42). Furthermore, effects of textbooks on students' environmental knowledge and awareness were already analyzed using logistic regression and discussed (see 4.3).

The chemistry teachers (27 out of 38; 65.8%) indicated that they were facing lack of instructional materials while teaching environmental issues (see Appendix R Table 43) and chemistry teachers (24 out of 41; 58.5%) believed that students' environmental awareness level would increase if supplementary materials/kits were provided (see Appendix R Table 40).

4.4.1 Inferential Analysis: Examining Instructional Materials as Predictors of Students' Environmental Knowledge and Awareness

Logistic regression analysis (Table IV.49), between "acid rain knowledge-cause (DV)" and "teacher has given reading and learning materials about acid rain (IV)" was conducted. Wald statistics indicated that reading and learning materials (instructional materials) (grade 9: $p<.01$, Exp(B)= 1.595) significantly predict knowledge of acid rain-cause. One unit increase in "teacher has given reading and learning materials" (use of instructional materials) increased the odds that 9th grade survey respondents have more knowledge about causes of acid rain by approximately 1.6 times (Exp(B)= 1.595).

Table IV.49 Regression results of grade 9: cause[a] (Q5) of acid rain (DV) and reading and learning materials (Q12-IV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	acidrainQ12read	.467	.142	10.782	1	.001	1.595
	Constant	1.126	.074	234.446	1	.000	3.085

Dependent Variable: How do you think acid rain is produced?

Regression results indicated that using instructional materials while teaching was also statistically reliable in distinguishing between knowing consequences of ozone depletion (Table IV.50). One unit increase in “teacher given reading and learning materials” (use of instructional materials) increased the odds that 8th grade and 9th grade survey respondents have more knowledge about consequences of ozone depletion by approximately 1.8 times (Exp(B)= 1.759) and by 1.5 times (Exp(B)= 1.455) respectively.

Table IV.50 Regression results of grade 8 and grade 9: consequences[a] (Q16) of ozone depletion (DV) and reading and learning materials (Q21-IV)

Variables in the Equation

grade 8	B	S.E.	Wald	df	Sig.	Exp(B)
ozonQ21read	.565	.180	9.846	1	.002	1.759
Constant	-.341	.200	2.901	1	.089	.711
grade 9	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
ozonQ21read	.375	.130	8.354	1	.004	1.455
Constant	-.476	.158	9.088	1	.003	.621

a. Dependent Variable: If the ozone layer problem becomes worse

Logistic regression results indicated that using reading and learning materials (instructional materials) while teaching not only acid rain and ozone depletion but also teaching greenhouse effect and environmental damages of batteries was significantly effective on students’ environmental knowledge. Table IV.51 results indicate that using instructional materials while teaching was statistically reliable in distinguishing between knowing greenhouse causing gas. One unit increase in “teacher given reading and learning materials” (use of instructional materials) increased the odds that 9th grade survey respondents have more knowledge about the greenhouse effect causing gas by approximately 1.4 times (Exp(B)= 1.349).

Table IV.51 Regression results of grade 9: what causes[a] (Q23) greenhouse effect (DV) and reading and learning materials (Q29-IV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 4[a]	greenQ29read	.300	.149	4.018	1	.045	1.349
	Constant	.366	.148	6.154	1	.013	1.442

a. Dependent Variable: Which of the following do you think is the main 'greenhouse gas'?

While teaching environmental damages of batteries in class 9, using instructional materials such as reading/learning materials and showing video/TV program/ slide related to the damages of batteries were found significantly effective on the students' environmental knowledge level ($p<.05$ and $p<.01$ respectively) (Table IV.52).

Table IV.52 Regression results of grade 9: actions (cure[a]) (Q35) to reduce environmental damages of batteries (DV) and reading and learning materials/ video-TV program-Slide (Q34-IVs)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 5[a]	batQ34read	-.458	.202	5.147	1	.023	.632
	batQ34show	-.861	.306	7.945	1	.005	.423
	Constant	1.246	.218	32.638	1	.000	3.477

a. Dependent Variable: Which one of the following actions do you think might reduce environmental damages of batteries

Logistic regression was conducted to determine reading and learning materials (instructional materials) as independent variable predictor of 8th grade students' environmental awareness as dependent variable. Regression results (Table IV.53) indicated that the teachers' use of video/TV programs/Slide while teaching acid rain was statistically reliable ($p<.05$) on 8th grade students' environmental awareness. Also, Wald statistics indicated that the variable "given reading and learning materials" significantly predicts 8th grade students' environmental awareness. Odds ratios for giving reading and learning materials related to the ozone depletion indicate by approximately 1.5 times (Exp(B)=1.417) change on the 8th grade students' environmental awareness level (Table IV.54).

Table IV.53 Logistic regression Wald statistics: grade 8 students' awareness (Q32-DV) and video/TV program/Slide (Q12-IV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12show	-.718	.349	4.240	1	.039	.488
	Constant	.266	.069	14.740	1	.000	1.305

Table IV.54 Logistic regression Wald statistics: grade 8 students' awareness (Q32-DV) and reading and learning materials (Q21-IV)

Variables in the Equation

grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozonQ21read	.349	.172	4.131	1	.042	1.417
	Constant	-.546	.230	5.653	1	.017	.579

The chemistry teachers were asked in Q25 (see Appendix G/H) "Have you used before or do you use Green Pack kit?" and "If your answer is yes, please write in your comments". As an instructional material, using "Green Pack kit" was found by most of the teachers effective and adequate (see 4.1.1.4.3). Teachers said that such kinds of kits were implemented in environmental education which was integrated as multidisciplinary into chemistry and other subjects.

In summary, chemistry teachers indicated that using instructional materials such as textbooks, reading and learning materials, and video/slide/TV programs while teaching environmental issues was effective on students' environmental awareness and needed to be improved and implemented. Teachers also believe that if environmental issues integrated instructional materials were provided to them, teaching environmental issues would be more effective while explaining them in the class. According to the results of chemistry teachers' responses to the instructional materials related questions, the null hypothesis that there is no positive effect on 8th and 9th grade students' environmental knowledge and awareness if environmental knowledge is integrated in the instructional materials was rejected.

Furthermore, logistic regression results indicated that using instructional materials while teaching some environmental issues was effective on students' knowledge and awareness level. Therefore, the null hypothesis that there is no positive effect on 8th and 9th grade students' environmental knowledge and awareness if environmental knowledge is integrated in the instructional materials was rejected.

The researcher detected other significant results while doing logistic regression analysis. The source of information about environmental issues was asked to the 8th and 9th grade students relating to acid rain, ozone depletion, greenhouse effect, and environmental damages of batteries. It was found that there was significant relation between "internet", "TV/radio", "Books", "Newspapers", "Magazines/Journals" and "Social media" as information sources and students' environmental knowledge and awareness. Those secondary sources which were used by students as a self-learning source or reference source are also another version of instructional materials. Therefore, the afore-mentioned sources can be used effectively by the chemistry teachers. Logistic regression results were as follows:

Logistic regression analysis results indicated that "internet" as independent variable predictor of 8th grade students' ozone depletion knowledge (cause and consequences) and greenhouse effect (cause) as dependent variables ($p<.001$, $p<.001$, and $p<.01$ respectively); and 9th grade students' environmental actions to reduce damages of batteries as dependent variable ($p<.01$) (see Appendix R Table 45, Table 46, Table 47 and Table 48). "TV/Radio" as independent variable predictor of 8th grade students' ozone depletion knowledge (cause) as dependent variables ($p<.05$); and 9th grade students' ozone depletion knowledge (consequences) and greenhouse effect (cause) as dependent variables ($p<.001$, and $p<.001$ respectively) (see Appendix R Table 45, Table 46 and Table 47). "Books" as independent variable predictor of 8th grade students' acid rain knowledge (cause) and 9th grade students' ozone depletion knowledge (cause) as dependent variables ($p<.001$, and $p<.001$ respectively) (see Appendix R Table 44 and Table 45). "Magazines/Journals" as independent variable predictor of 8th grade students' acid rain knowledge (cause) as dependent variable ($p<.05$) (see Appendix R Table 44).

"Newspapers" as independent variable predictor of 8th grade students' environmental awareness (DV) related to acid rain ($p<.05$) and 9th grade students' environmental awareness (DV) related to damages of batteries ($p<.05$). "TV/Radio" as independent variable predictor of 8th grade students' environmental awareness (DV) related to ozone depletion ($p<.05$) and 9th grade students' environmental awareness (DV) related to acid rain ($p<.05$). "Books" as independent variable predictor of 8th grade students' environmental awareness (DV) related to greenhouse depletion ($p<.01$) and 9th grade students' environmental awareness (DV) related to acid rain ($p<.001$), ozone depletion ($p<.001$), greenhouse effect ($p<.001$), and damages of batteries ($p<.01$). "Magazines/Journals" as independent variable predictor of 8th grade students' environmental awareness (DV) related to greenhouse effect ($p<.01$). "Social Media" as independent variable predictor of 9th grade students' environmental awareness (DV) related to damages of batteries ($p<.01$) (see Appendix R from Table 49 to Table 52).

4.5 Effects of Making Use of Environmental Opportunities on 8th and 9th Grade Students' Environmental Knowledge and Awareness

The fourth research question in this study was "What are the effects of making use of environmental opportunities such as environment trips, cooperation with non-government organizations and communities, etc. on environmental knowledge and awareness of students of 8^{th} and 9^{th} grade?". To answer this question, the following null hypothesis was tested:

"There is no significant change in the level of environmental knowledge and awareness of 8^{th} and 9^{th} grade students, if chemistry teachers are able to make efficient use of all kinds of environmental opportunities."

4.5.1 Descriptive Results: Use of Environmental Opportunities

The chemistry teachers were asked, "Which activities students conduct at school/ at home in class 8?". Their use of environmental opportunities related responses such as recycling project, planting, community awareness, excursion, cleaning, and exhibition were 39 (58.2%) in total out of 67 responses. The chemistry teachers responses in grade 9 were 32 (55.2%) in total out of 58 responses (see Appendix R Table 53 and Table 54 and see also Appendix X).

The chemistry teachers were asked, "What could be done to improve environmental awareness of students?". The responses of teachers were as follows: 25 teachers (N=41) said field trips, which was the highest response, 18 teachers said cooperation with local community, 13 teachers said conferences/seminars, 12 teachers said inviting experts in the classroom, and 5 said cooperation with NGOs. Chemistry teachers' responses in total related to making use of environmental opportunities were only 73 (34.1%) out of 214 responses (see Appendix R Table 55).

The 8^{th} and 9^{th} grade students were asked, "Which environmental programs were organized in the school?" Their responses were as follows: In the 8^{th} grade, out of 1474 responses, 103 (6.9%) students responded "talk by experts" and 74 (5.0%) responded "seminars". In the 9^{th} grade, out of 2878 responses, 310 (10.8%) students responded "talk by experts" and 131 (4.5%) responded "seminars". (see Appendix R Table 56 and Table 57).

8th and 9th grade students were asked, “Have you participated in any environmental trip/nature camps/cleaning program/ other outdoor activities?”. The highest response was “participated in a cleaning program” with 786 (35.6%) out of 2207 responses and with 1337 (34.9%) out of 3829 responses among 8th and 9th grade students respectively. Second highest responses were “environmental trip” with 30% (662 responses) among 8th grade students and with 29.6% (1134 responses) among 9th grade students. “Other outdoor activities” had 23.8% (526 responses) and 20.0% (767 responses) among 8th and 9th grade students respectively. “Nature camps” had 10.6% (233 responses) and 15.4% (591 responses) among 8th and 9th grade students respectively (see Appendix R Table 58 and Table 59).

4.5.2 Inferential Analysis: Making Use of Environmental Opportunities as Predictors of Students’ Environmental knowledge and Awareness

In Table IV.55, logistic regression Wald statistics indicated that participation in nature camps significantly predicts knowledge of ozone depletion cause ($p<.01$) and consequences ($p<.05$) and students’ awareness level ($p<.001$).

Table IV.55 Logistic regression Wald statistics, 8th and 9th grade (combined): dependent variable[a] and participated nature camps as independent variable (Q31b/Q37b)

Variables in the Equation

Dependent Variables[a]	B	S.E.	Wald	df	Sig.	Exp(B)
Students’ awareness (Q32/38)	-.271	.104	6.873	1	.009	.762
constant	.221	.069	10.281	1	.001	1.247
Ozone knowledge (cause) (Q15)	-.278	.124	4.985	1	.026	.757
constant	-1.742	.215	65.663	1	.000	.175
Ozone knowledge (consq.) (Q16)	-.399	.109	13.499	1	.000	.671
constant	.294	.153	3.691	1	.055	1.342

Logistic regression results (Table IV.56) indicated that organizing talk by experts was significantly effective on students’ awareness level ($p<.01$), on knowledge of ozone depletion cause ($p<.01$) and consequences ($p<.001$), on knowledge of greenhouse effect ($p<.05$), and on environmental actions to reduce damages of batteries (p<.05).

Table IV.56 Logistic regression Wald statistics, 8th and 9th grade (combined): dependent variable[a] and school/teacher organized talk by experts as independent variable (Q30a/Q36a/Q29)

Variables in the Equation

Dependent Variables[a]		B	S.E.	Wald	df	Sig.	Exp(B)
Students' awareness (Q32/38)		-.334	.118	8.038	1	.005	.716
	constant	-.279	.098	8.021	1	.005	.757
Ozone knowledge (cause) (Q15)		-.398	.142	7.834	1	.005	.672
	constant	-.957	.062	238.367	1	.000	.384
Ozone knowledge (consq.) (Q16)		-.457	.118	14.915	1	.000	.633
	constant	.270	.101	7.227	1	.007	1.311
Greenhouse eff. knowledge (Q23)		-.623	.257	5.884	1	.015	.536
	constant	.623	.126	24.570	1	.000	1.865
Damages of batteries (actions) (Q35)		.561	.252	4.930	1	.026	1.752
	constant	1.185	.183	42.023	1	.000	3.271

Using 8th and 9th grade survey results, logistic regression analysis (Table IV.57), between dependent variables (acid rain knowledge, ozone depletion knowledge (cause), ozone depletion knowledge (consequences), greenhouse effect knowledge, and damages of batteries-actions) and participated in a cleaning program as independent variable was conducted. Regression results indicate the overall model of participation in a cleaning program statistically reliable in distinguishing between the afore-mentioned dependent variables.

Table IV.57 Logistic regression Wald statistics, 8th and 9th grade (combined): dependent variable[a] and participated in a cleaning program as independent variable (Q31c/Q37c)

Variables in the Equation

Dependent Variables[a]		B	S.E.	Wald	df	Sig.	Exp(B)
Acid rain knowledge (Q5)		.352	.164	4.626	1	.031	1.422
	constant	.827	.151	29.951	1	.000	2.286
Ozone knowledge (cause) (Q15)		.712	.221	10.374	1	.001	2.038
	constant	-1.742	.215	65.663	1	.000	.175
Ozone knowledge (consq.) (Q16)		.608	.159	14.648	1	.000	1.837
	constant	.294	.153	3.691	1	.055	1.342
Greenhouse eff. knowledge (Q23)		.416	.165	6.319	1	.012	1.516
	constant	.646	.153	17.791	1	.000	1.908
Damages of batteries (actions) (Q35)		.768	.235	10.707	1	.001	2.155
	constant	1.676	.224	55.970	1	.000	5.343

Wald statistics indicated that: participation in a cleaning program (p<.05, Exp(B)= 1.422) significantly predicts knowledge of acid rain effect. One unit increase in participated in a cleaning program increased the odds that 8^{th} and 9^{th} grade survey respondents have more knowledge about what causes acid rain by 1.4 times. Participation in a cleaning program (p<.01, Exp(B)= 2.038) significantly predicts knowledge of ozone depletion cause. One unit increase in participated in a cleaning program increased the odds that 8^{th} and 9^{th} grade survey respondents have more knowledge about what causes ozone depletion by two times. Participation in a cleaning program (p<.001, Exp(B)= 1.837) also significantly predicts knowledge of ozone depletion consequences. One unit increase in participated in a cleaning program increased the odds that 8^{th} and 9^{th} grade survey respondents have more knowledge about the consequences of ozone depletion by approximately 1.8 times. Further, participation in a cleaning program (p<.05, Exp(B)= 1.516) significantly predicts knowledge of which gas causes the greenhouse. One unit increase in participated in a cleaning program increased the odds that 8^{th} and 9^{th} grade survey respondents have more knowledge about greenhouse effect causing gas by one and a half times Participation in a cleaning program (p<.01, Exp(B)= 2.155) also significantly predicts knowledge of which actions reduce environmental damages of batteries. One unit increase in participated in a cleaning program increased the odds that 8^{th} and 9^{th} grade survey respondents have more knowledge about actions that reduce environmental damages of batteries by approximately two times.

Table IV.58 Logistic regression Wald statistics, 8^{th} and 9^{th} grade (combined): dependent variable[a] and teacher organized trip/outdoor activity as independent variable (Q12)

Variables in the Equation

Dependent Variables[a]	B	S.E.	Wald	df	Sig.	Exp(B)
Acid rain knowledge (Q5)	-.628	.254	6.110	1	.013	.533
constant	.851	.054	249.157	1	.000	2.342
Ozone knowledge (consq.) (Q16)	-.644	.258	6.209	1	.013	.525
constant	-.444	.129	11.856	1	.001	.642

Greenhouse eff. knowledge (Q23)	-1.028	.292	12.352	1	.000	.358
constant	.623	.126	24.570	1	.000	1.865

Logistic regression results (Table IV.58) indicated that while teaching topics of acid rain, ozone depletion consequences and greenhouse effect, making use of environmental opportunities such as fieldwork, educational trips, and outdoor activities was significantly effective ($p<.05$, $p<.05$, and $p<.001$ respectively) on 8th and 9th grade students' knowledge level.

Table IV.59 Logistic regression Wald statistics, 8th and 9th grade (combined): dependent variable[a] and conferences (source) as independent variable (Q26/Q31)

Variables in the Equation

Dependent Variables[a]	B	S.E.	Wald	df	Sig.	Exp(B)
Greenhouse eff. knowledge (Q23)	-.986	.280	12.394	1	.000	.373
constant	-.152	.190	.645	1	.422	.859
Damages of batteries (actions) (Q35)	1.043	.417	6.244	1	.012	.352
constant	1.929	.109	315.687	1	.000	6.885

Attending conferences was found to be significantly effective on students' greenhouse effect knowledge ($p<.001$) and knowing how to reduce environmental damages of batteries ($p<.05$) (Table IV.59).

Table IV.60 Logistic regression Wald statistics, 8th and 9th grade (combined): dependent variable[a] and participation in other outdoor activities as independent variable (Q31d/Q37d)

Variables in the Equation

Dependent Variables[a]	B	S.E.	Wald	df	Sig.	Exp(B)
Ozone knowledge (consq.) (Q16)	-.359	.111	10.536	1	.001	.699
constant	.294	.153	3.691	1	.055	1.342
Damages of batteries (actions) (Q35)	-.389	.186	4.370	1	.037	.678
constant	1.676	.224	55.970	1	.000	5.343

The chemistry teachers responded to the question, "Which activities students conduct at school/at home in class 8 and class 9?" as recycling project, planting, exhibition, and community awareness activities. All these activities might be considered under the “other” by students especially recycling project which might be related to disposal of batteries. The regression results (Table IV.60) indicated that participation in such activities significantly predicts knowledge of ozone depletion consequences ($p<.01$) and knowledge of actions to reduce damages of batteries to the environment ($p<.05$).

The dependent variables predicted in the regression analyses in order to determine the effects of making use of environmental opportunities on 8^{th} and 9^{th} grade students’ environmental knowledge and awareness, were “Acid rain knowledge (Q5)”, “Ozone knowledge (cause) (Q15)”, “Ozone knowledge (consequences) (Q16)”, “Greenhouse effect knowledge (Q23)”, and “Damages of batteries (actions) (Q35)”, and “Students’ awareness (Q32/38)”. The independent variables included in the regression analyses were “participated in nature camps”, “school/teacher organized talk by experts”, “participated in a cleaning program”, “teacher organized trip/outdoor activity”, “conferences (source)”, and “participated in other outdoor activities”. After analyzing the data related to the use of environmental opportunities, it was revealed that “participated in nature camps” was predictor of 3 dependent variables (Table IV.55), “school/teacher organized talk by experts” was predictor of 5 dependent variables (Table IV.56), “participated in a cleaning program” was predictor of 5 dependent variables (Table IV.57), “teacher organized trip/outdoor activity” was predictor of 3 dependent variables (Table IV.58), “conferences (source)” was predictor of 2 dependent variables (Table IV.59), and “participated other outdoor activities” was predictor of 2 dependent variables (Table IV.60). The null hypothesis that there is no significant change in the level of environmental knowledge and awareness of 8^{th} and 9^{th} grade students if chemistry teachers are able to make efficient use of all kinds of environmental opportunities was rejected.

4.6 Summary of Inferential Analyses

In summary, binary logistic regression analyses indicated that

- content knowledge of chemistry teachers while teaching acid rain, ozone depletion, and greenhouse effect in class 8; and ozone depletion, greenhouse effect, and environmental damages of batteries in class 9 was significantly effective on students' environmental knowledge;
- content knowledge of chemistry teachers while teaching greenhouse effect in class 8; and ozone depletion and greenhouse effect in class 9 was significantly effective on students' environmental awareness;
- chemistry curriculum content was significantly effective on students' environmental awareness;
- using instructional materials while teaching ozone depletion in class 8; and acid rain, ozone depletion, greenhouse effect ,and environmental damages of batteries in class 9 was significantly effective on students' environmental knowledge;
- using instructional materials while teaching acid rain and ozone depletion in class 8 was significantly effective on students' environmental awareness; and
- making use of all kinds of opportunities while teaching environmental problems was significantly effective on students' environmental knowledge and awareness level.

Therefore the three null sub-hypotheses (Hyp0.1, Hyp0.2, and Hyp0.4) were rejected and the one null sub-hypothesis (Hyp0.3) was partially rejected (see Chapter I 1.4 Hypotheses).

CHAPTER V: CONCLUSION

5.1 Overview

Improper environmental practices cutting across the individual, corporate, government and societal levels have contributed to the numerous environmental problems that the world is experiencing today. Environmental education is deemed as most effectual in dealing with the existent problems and those that may emerge in future. The escalation of these problems actually gives more credence to the need to boost environmental education. Studying of environmental issues from diverse perspectives should be encouraged from the primary school level (UNESCO, 1997). Further, transformation of the mindsets of individuals' should be sought in both the formal and non-formal education settings as it is crucial to individuals' ability to determine sustainable development (Agenda21, 1992). This means raising people with not only ecological knowledge but also values that lead to action. In other words, a completely literate people (Morrone et al., 2001).

While environmental education has been approached in diverse ways in the various subjects at the lower secondary school level, this study demonstrates that chemistry has been considerably influential on the environmental knowledge and awareness of the students.

Hypothesis: "Chemistry subject has significant influence on 8th and 9th grade students' environmental knowledge and awareness."

The contribution of chemistry as a subject to the environmental knowledge and awareness of students is well illustrated in this study. This has been accomplished through a blend of pedagogical initiatives and theoretical developments subjected to an investigation through a study of original data. The study, more so in the qualitative and quantitative aspects of it, has aided in the recognition of the degree, nature, disparities and limitations of the contemporary content knowledge, pedagogical approaches and practices of various chemistry teachers and the curriculum and teaching resources employed in environmental education and environmental awareness to students in the teaching of chemistry especially on environmental issues.

Sub-hypothesis: "There will be significant differences on students' environmental knowledge and awareness if 8th and 9th grade chemistry curriculum includes environmental contents."

Environmental education is officially treated as a cross-curricular subject. It is viewed as a 'holistic experience' that relates to all subjects; a philosophy of learning traversing the whole curriculum. Lower secondary teachers are advised to consider it a constituent of the curriculum in its entirety. It is therefore taught through the core subjects such as Albanian language, science and mathematics and foundation subjects such as geography, history, and civic education.

In a curriculum that is by and large dedicated to Albanian language, science and mathematics, the challenge lies in ensuring effective linkage between environmental education and other subjects in the process of its implementation.

In this study, the possibility of a merging point that acknowledges the interdisciplinary nature of environmental education and also facilitates its integration in the curriculum via a specified subject is established. Opting for chemistry as a central subject may be beneficial given the indication that it was the most influential subject on the environmental knowledge and awareness level of students according to the results of the study (see 4.3). It is also worth noting that, chemicals or compounds that are included in the grade 8 and 9 chemistry topics are the causes of most of the global environmental issues. Additionally, environmental education is at risk of not being given the attention due to it by lower secondary school teachers in the proposed model of the curriculum as the model lays emphasis on the core and foundation subjects. Teachers are likely to be motivated to pay more attention to learning that is observable and measurable as prominence may be placed on short-term achievements. The incorporation of affective and moral aims may translate to negligence of environmental education. Taking this into consideration, chemistry as a subject can be an effective means of implementing environmental education.

Sub-hypothesis: "There is relationship between 8th and 9th grade students' environmental knowledge and awareness and chemistry teachers' environmental knowledge."

While the development of a curriculum and consequent implementation is important, it is, per se, not adequate for environmental education. The teachers' approach to environmental education is also significant. Currently, some of the approaches adopted by teachers are not in line with the guidance of the IZHA. With no enforcement of accountability in environmental education, the onus of environmental education is on the teachers. In determining the knowledge that forms the framework for students' environmental education, is cause for concern (see Appendix R Tables 16-22).

In the achievement of the goals and objectives of environmental education at the lower secondary school, the teachers at this level need to be more informed. In order to increase the awareness level of students, teachers involved in this study stressed on the need for in-service training to enhance their teaching of environmental education (see Appendix R Table 32).

The content knowledge level of chemistry teachers was evaluated in the course of this study and the participants' content knowledge was found to be adequate. In addition, the professional background (see 4.1.1.4), used teaching/learning strategies (see 4.2.5.2), perception of importance of environmental education (see Appendix R Table 28), perception of chemistry topics (Chapter IV, Table 4.23), importance of environmental problems (see 4.2.5.3), self-evaluation on environmental knowledge (see 4.2.5.3), and teaching environmental issues (cause, consequences, and cure) choices were the factors affecting environmental knowledge and awareness level of the students (see 4.2.6).

The students main source of information on environmental issues was the school (see Chapter IV, 4.2.2). Other significant sources of information on the environmental were identified as books and the internet (see Chapter IV, 4.2.2).

Sub-hypothesis: "If chemistry teachers are able to make efficient use of all kinds of environmental opportunities, there will be significant change in the level of environmental knowledge and awareness of 8th and 9th grade students."

Outdoor activities in which students utilize environmental opportunities are vital to environmental education and in this study, they were established to be positive (see 4.5). Experiences in the natural environment were instrumental in the students' acquisition of knowledge on the environment and associated issues (see Table IV.55, Table IV.57, and Table IV.58). These activities enhanced the students' appreciation of nature and acknowledgement of environmental issues. According to Erdoğan & Mısırlı (2007), Students can develop a sense of responsibility and motivation to take action owing to the aroused curiosity and involvement in the natural activities. The results of the Chi-square analyses showed that a significantly higher proportion of the students who indicated that they consider environmental issues to be personally 'very important' had participated in cleaning programs (see 4.2.1.3).

Sub-hypothesis: "There will be positive effect on 8th and 9th grade students' *environmental knowledge and awareness if environmental knowledge is integrated to the instructional materials."*

Well exhibited in this study is that in the teaching of chemistry, environmental topics integrated in textbooks and environmental knowledge integrated instructional materials need to be effectively used if the high expectations of students' environmental knowledge and awareness levels are to be met (see 4.4). The study also shows that chemistry teachers realize the significance of employing instructional materials in their work (see 4.1.1.4.3 and Appendix R Table 44).

In conclusion, it can well be said that there is more to environmental education than just specific content of education. Environmental education should actually be viewed as a foundation for developing a lifestyle of harmony with nature (UNESCO, 1997). This study forms a foundation for further research that will surpass the current focus and limitations, taking greater advantage of the research design, the availed data and analysis.

5.2 Recommendations for Action

A number of proposals for policy developers, teachers, and teacher educators have been put forward by this study:

1) The environmental knowledge level of close to 24% and 26% of grade 8 and 9 respondents respectively, as indicated by the results of the study, was inadequate. In the learning and carrying out of environmental related topics and activities, the teachers' role is utterly vital. The students' comprehension of the environment can be aided by the teachers' information on environmental related activities and topics. The indication by majority of the teachers of the need for environmental courses is a pointer to the necessity of incorporating environmental education in pre-service teacher training programs while

considering its interdisciplinary nature. In-service training programs for teachers should also include environmental education.

2) Maximum utilization of the popular sources of environmental information which were stated as school, internet and books should be made for students, teachers and by extension, the society's education.

3) Students' awareness, as indicated in the results of this study, was considerably linked to certain activities. Extra-curricular activities that facilitate students' active involvement in environmental clubs and associations should therefore be catered for by chemistry teachers and textbook designers with the aim of imparting skills that would enhance students' environmental knowledge and awareness.

4) Chemistry teachers should endeavor to plan for field trips within the school environs. Outdoor activities have proved to positively influence the students' environmental knowledge and awareness levels as indicated by the results of this study. Trips to diverse natural and manmade settings can arouse curiosity and instill individual responsibility. To make maximum use of outdoor activities and facilitate better students' observation of nature, probable issues affecting the natural balance and responsible behavior that can be engaged to protect the environment, teachers can prepare activity sheets.

5) Effort should be made to expose students to environmental action exercises such as tree-planting, waste management, rubbish collection etc. Schools should also endeavor to have and implement an environmental school policy. In addition, schools' vision and mission statements should incorporate the concept of "environmentally literate students". These suggestions can form a foundation for environmentally friendly schools.

6) Participation in environmental related activities by chemistry teachers after completion of their teacher training should be encouraged. These activities include studies of social clubs, outdoor activities, and environmental programs organized by non-governmental organizations.
7) In the enhancement of students' environmental knowledge and awareness, policy makers and pressure groups can be instrumental. Effort should be made by the Ministry of Environment, NGOs and Municipalities to collaboratively design nature-education programs and extend invitations to students from private and public in Albania to attend.
8) Integration of environmental education into the various school subjects has proved challenging to teachers as exhibited in the results of this study. There is therefore need for curriculum developers to revise the approach taken in the integration of environmental education into the school curriculum. There should be precision of the core areas to be covered which include but are not limited to ecology, the built environment, environmental issues and problems, environmental management and sustainable development. To facilitate implementation, there should be structuring of the relevant topics and issues to include performance objectives, content to be taught, teachers' activities including teaching methods, learners' activities and teaching materials. In addition, the assessment guidelines for each subject syllabus should be clearly defined.
9) Environmental education has continually been plagued by a scarcity of teaching and learning resources. This can be addressed by the development and distribution of environmental education materials to education institutions of all levels.

10) In facilitating students' acquisition of knowledge and attitudes, direct experience in the environment where students carry out investigation backed by classroom materials has proved more effective as opposed to the conventional method of lectures in the classroom. For further teaching in class or reading by pupils and extra-curricular activities, modified instructional material with coloring and illustration could be employed.
11) Regular review of instructional techniques and textbooks should be conducted and teaching methods that include investigation, discovery and problem-solving implemented.

5.3 Recommendations for Further Research

Environmental education is interdisciplinary in nature and, while this study focused on chemistry teachers only, teachers from other areas of study are also required to be environmentally literate. This therefore calls for further studies on teachers of all other disciplines to evaluate their environmental literacy levels.

On ways in which environmental education can be enhanced, additional qualitative studies can be carried out to establish the teachers' views and suggestions on how this can be achieved including new techniques and resources that can be employed.

The main focus of the research in this thesis was students' environmental knowledge and awareness. Prospective research studies should broaden their horizons to a nation-wide study on environmental attitudes and behaviors.

To assess students' environmental knowledge and awareness, a replication of this study can be done using a different sampling procedure or by employing another instrument. This kind of studies would be opportune for comparison purposes with the results of this study.

In the teaching/ learning of chemistry, this study considered the effects of variables such as teachers’ content knowledge, curriculum, instructional material and use of environmental opportunities on students’ environmental knowledge and awareness. Environmental education at all levels can be reviewed on the basis of the results of this study. There is also need to evaluate the influence of other disciplines on students’ environmental knowledge and awareness and diverse ways in which it can be enhanced.

REFERENCES

Primary Sources

Abell, S. K., Rogers, M. A. P., Hanuscin, D. L., Lee, M. H., & Gagnon, M. J. (2009). Preparing the next generation of science teacher educators: A model for developing PCK for teaching science teachers. *Journal of Science Teacher Education, 20*(1), 77-93.

Agenda21. (1992). PROMOTING EDUCATION, PUBLIC AWARENESS AND TRAINING. Retrieved June 9, 2015, from http://www.unep.org/documents.multilingual/default.asp?DocumentID=52&ArticleID=4415&l=en

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

Al-Alwan, A. F. (2014). Teachers' Self-efficacy as Determinant of Students' Attitudes toward School: A study at the School Level. *Review of European Studies, 6*(1), p171.

Alp, E., Ertepinar, H., Tekkaya, C., & Yilmaz, A. (2008). A survey on Turkish elementary school students' environmental friendly behaviours and associated variables. *Environmental Education Research, 14*(2), 129-143.

Alp, E., Ertepınar, H., Tekkaya, C., & Yılmaz, A. (2006). İlköğretim öğrencilerinin çevreye yönelik tutum ve bilgileri üzerine bir çalışma. *VII. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi Özetler Kitabı, 110*, 07-09.

Arbuthnot, J. (1977). The roles of attitudinal and personality variables in the prediction of environmental behavior and knowledge. *Environment and Behavior, 9*(2), 217-232.

Bal, Ş. (2004). Determination of pre-service science teachers' misconceptions concerning greenhouse effect. *Eurasian Journal of Educational Research (EJER)*(17).

Ballantyne, R., Fien, J., & Packer, J. (2001). School environmental education programme impacts upon student and family learning: A case study analysis. *Environmental Education Research, 7*(1), 23-37.

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

Barraza, L., & Cuarón, A. D. (2004). How values in education affect children's environmental knowledge. *Journal of biological education, 39*(1), 18-23.

Basile, C. G. (2000). Environmental education as a catalyst for transfer of learning in young children. *The Journal of Environmental Education, 32*(1), 21-27.

Bego, F., Bino, T., Vaso, A., & Kromidha, G. (2005). NATIONAL CAPACITY SELF-ASSESSMENT RELATED TO ENVIRONMENTAL MANAGEMENT OF GLOBAL CONVENTIONS.

Bogler, R., & Somech, A. (2004). Influence of teacher empowerment on teachers' organizational commitment, professional commitment and organizational citizenship behavior in schools. *Teaching and Teacher Education, 20*(3), 277-289.

Brundtland, G. H. (1987). *Report of the World Commission on environment and development:" our common future."*: UN.

Cerit, Y. (2011). THE RELATIONSHIP BETWEEN PRE-SERVICE CLASSROOM TEACHERS'SELF-EFFICACY BELIEFS AND CLASSROOM MANAGEMENT ORIENTATIONS. *Buca Eğitim Fakültesi Dergisi*(30), 156-174.

Chambers, S. M., & Hardy, J. C. (2005). Length of Time in Student Teaching: Effects on Classroom Control Orientation and Self-Efficacy Beliefs. *Educational Research Quarterly, 28*(3), 3-9.

Chatzifotiou, A. (2001). *Primary school teachers' awareness of and motivation to teach environmental education in two European countries.* Durham University.

Chatzifotiou, A. (2006). Environmental education, national curriculum and primary school teachers. Findings of a research study in England and possible implications upon education for sustainable development. *The Curriculum Journal, 17*(4), 367-381.

Chawla, L. (1999). Life paths into effective environmental action. *The Journal of Environmental Education, 31*(1), 15-26.

Cho, Y., & Shim, S. S. (2013). Predicting teachers' achievement goals for teaching: The role of perceived school goal structure and teachers' sense of efficacy. *Teaching and Teacher Education, 32*, 12-21.

Cloquell-Ballester, V.-A., Monterde-Díaz, R., Cloquell-Ballester, V.-A., & del Carmen Torres-Sibille, A. (2008). Environmental education for small-and medium-sized enterprises: methodology and e-learning experience in the Valencian region. *Journal of environmental management, 87*(3), 507-520.

Commission, W. (1987). Our common future. The world commission on environment and development: Oxford: Oxford University Press.

CONSTITUTION, A. PART TWO--THE FUNDAMENTAL HUMAN RIGHTS AND FREEDOMS. Retrieved June 9, 2015, from http://www.ipls.org/services/constitution/const98/cp2.html

Cornelissen, G., Pandelaere, M., Warlop, L., & Dewitte, S. (2008). Positive cueing: Promoting sustainable consumer behavior by cueing common environmental behaviors as environmental. *International Journal of Research in Marketing, 25*(1), 46-55.

Cronin-Jones, L. L. (2000). The effectiveness of schoolyards as sites for elementary science instruction. *School Science and Mathematics, 100*(4), 203-211.

De Young, R. (2000). New ways to promote proenvironmental behavior: Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues, 56*(3), 509-526.

DeChano, L. M. (2006). A multi-country examination of the relationship between environmental knowledge and attitudes. *International Research in Geographical and Environmental Education, 15*(1), 15.

Declaration, S. (1972). Declaration of the United Nations conference on the human environment. *URL= http://www. unep. org/Documents. Multilingual/Default. asp*.

Dedej, Z. (2002). National Report on Marine and Coastal Biodiversity. *Republic of Albania Tirana, March 2002*.

Derksen, L., & Gartrell, J. (1993). The social context of recycling. *American sociological review*, 434-442.

Dettmann-Easler, D., & Pease, J. L. (1999). Evaluating the effectiveness of residential environmental education programs in fostering positive attitudes toward wildlife. *The Journal of Environmental Education, 31*(1), 33-39.

Devine-Wright, P., Devine-Wright, H., & Fleming, P. (2004). Situational influences upon children's beliefs about global warming and energy. *Environmental Education Research, 10*(4), 493-506.
Dietz, T., Stern, P. C., & Guagnano, G. A. (1998). Social structural and social psychological bases of environmental concern. *Environment and Behavior, 30*(4), 450-471.
Dimopoulos, D. I., & Pantis, J. D. (2003). Knowledge and attitudes regarding sea turtles in elementary students on Zakynthos, Greece. *The Journal of Environmental Education, 34*(3), 30-38.
DİNÇER, Z. (2012). A COMPARISON OF SELECTED ELEMENTARY CURRICULA IN REGARD TO AN ACTION BASED ENVIRONMENTAL CURRICULUM FOR ELEMENTARY SCHOOLS IN TURKEY.
DIRECTORATE, B. (2010). REPUBLIC OF ALBANIA MINISTRY ENVIROINMENT, FORESTS AND WATER ADMINISTRATION BIODIVERSITY DIRECTORATE.
Erdem, E., & Demirel, Ö. (2007). Teacher self-efficacy belief. *Social Behavior and Personality: an international journal, 35*(5), 573-586.
ERDOĞAN, M. (2009). *FIFTH GRADE STUDENTS'ENVIRONMENTAL LITERACY AND THE FACTORS AFFECTING STUDENTS'ENVIRONMENTALLY RESPONSIBLE BEHAVIORS.* Middle East Technical University.
Ernst*, J., & Monroe, M. (2004). The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research, 10*(4), 507-522.
Erol, G. H. (2005). *Sınıf öğretmenliği ikinci sınıf öğrencilerinin çevre ve çevre sorunlarına yönelik tutumları.* Pamukkale Üniversitesi.
Erten, S. (2003). 5. sınıf öğrencilerinde" çöplerin azaltılması" bilincinin kazandırılmasına yönelik bir öğretim modeli. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 25*(25).
Falk, J. H., & Dierking, L. D. (1997). School field trips: assessing their long-term impact. *Curator: The Museum Journal, 40*(3), 211-218.
Goldman, D., Yavetz, B., & Pe'er, S. (2006). Environmental literacy in teacher training in Israel: Environmental behavior of new students. *The Journal of Environmental Education, 38*(1), 3-22.
Gooch, M., Rigano, D., Hickey, R., & Fien, J. (2008). How do primary pre-service teachers in a regional Australian university plan for teaching, learning and acting in environmentally responsible ways? *Environmental Education Research, 14*(2), 175-186.
Hsu, S.-J., & Roth, R. E. (1999). Predicting Taiwanese secondary teachers' responsible environmental behavior through environmental literacy variables. *The Journal of Environmental Education, 30*(4), 11-18.
Hwang, Y.-H., Kim, S.-I., & Jeng, J.-M. (2000). Examining the causal relationships among selected antecedents of responsible environmental behavior. *The Journal of Environmental Education, 31*(4), 19-25.
IUCN. (1970). International Working Meeting on Environmental Education in the School Curriculum *Final Report*.
IUCN. (1972). European Working Conference on Environmental Conservation Education *IUCN PUBLICATIONS NEW SERIES*. Morges, Switzerland.
IUCN, U. (1980). WWF, 1980: World Conservation Strategy. *World Conservation Union, United Nations Environment Programme, Word Wide Fund for Nature,*

Gland.
IUCN, U. (1991). WWF (1991) Caring for the Earth: a strategy for sustainable living. *IUCN, UNEP, WWF, Gland*.
IZHA. (2006). LËNDA: Kimi (klasa e tetë). Retrieved 15.08.2015 http://izha.edu.al/View/Biblioteka%20Items/1.%20Programet%20lendore/2.%20Programet%20e%20arsimit%20baze/Arsimi%20baze/Klasa%20VIII/Kimia%208.pdf
IZHA. (2007). LËNDA: Kimi (klasa e nëntë). Retrieved 15.08.2015 http://izha.edu.al/View/Biblioteka%20Items/1.%20Programet%20lendore/2.%20Programet%20e%20arsimit%20baze/Arsimi%20baze/Klasa%20IX/05Kimia%209-marita.pdf
Jenkins, K. A., & Jenkins, B. A. (2005). Education for Sustainable Development and the Question of Balance: Lessons from the Pacific. *Current Issues in Comparative Education, 7*(2), 114-129.
Jurin, R. R., & Fortner, R. W. (2002). Symbolic beliefs as barriers to responsible environmental behavior. *Environmental Education Research, 8*(4), 373-394.
Khalid, T. (2001). Pre-service teachers' misconceptions regarding three environmental issues. *Canadian Journal of Environmental Education (CJEE), 6*(1), 102-120.
Krasniqi, G. (2010). Country report: Albania.
Lazarowitz, R., Hertz-Lazarowitz, R., & Baird, J. H. (1994). Learning science in a cooperative setting: Academic achievement and affective outcomes. *Journal of research in science teaching, 31*(10), 1121-1131.
Leeming, F. C., Dwyer, W. O., & Bracken, B. A. (1995). Children's environmental attitude and knowledge scale: Construction and validation. *The Journal of Environmental Education, 26*(3), 22-31.
Leeming, F. C., Porter, B. E., Dwyer, W. O., Cobern, M. K., & Oliver, D. P. (1997). Effects of participation in class activities on children's environmental attitudes and knowledge. *The Journal of Environmental Education, 28*(2), 33-42.
Ligj-English. (2012). *NR.69 ON PRE-UNIVERSITY EDUACTION SYSTEM IN THE REPUBLIC OF ALBANIA*. Official Gazette of the Republic of Albania Retrieved from http://phzh.ch/globalassets/ipe.phzh.ch/projekte/laenderubergreifende-projekte/nezi-netzwerk-albanischer-sprachraum/4_nezi-konferenz-2/lapu-nr.69-2012-english.pdf.
LIGJ. (2012). *Nr. 69 PËR SISTEMIN ARSIMOR PARAUNIVERSITAR NË REPUBLIKËN E SHQIPËRISË*. Fletorja Zyrtare e Republikës së Shqipërisë Retrieved from http://www.arsimi.gov.al/files/userfiles/arkiva/dok-0029.pdf.
Logan, C. O. (2006). *Carbon dioxide absorption and durability of carbonation cured cement and concrete compacts.* Paper presented at the Masters Abstracts International.
Marinopoulos, D., & Stavridou, H. (2002). The influence of a collaborative learning environment on primary students' conceptions about acid rain. *Journal of biological education, 37*(1), 18-25.
MAS. (2015). Shkollat e gjelbra. Retrieved June 4, 2015, from http://www.arsimi.gov.al/al/newsroom/lajme/shkollat-e-gjelbra
McNaughton, M. J. (2004). Educational drama in the teaching of education for sustainability. *Environmental Education Research, 10*(2), 139-155.
MES. (2014). *STRATEGY ON PRE-UNIVERSITY EDUCATION DEVELOPMENT*

2014-2020 Retrieved from http://www.academia.edu/11411662/STRATEGY_ON_PRE-UNIVERSITY_EDUCATION_DEVELOPMENT_2014-2020_Draft_

Michail, S., Stamou, A. G., & Stamou, G. P. (2007). Greek primary school teachers' understanding of current environmental issues: An exploration of their environmental knowledge and images of nature. *Science Education, 91*(2), 244-259.

Millar, C. I., Stephenson, N. L., & Stephens, S. L. (2007). Climate change and forests of the future: managing in the face of uncertainty. *Ecological applications, 17*(8), 2145-2151.

Moody, G., Alkaff, H., Garrison, D., & Golley, F. (2005). Assessing the environmental literacy requirement at the University of Georgia. *The Journal of Environmental Education, 36*(4), 3-9.

Mosothwane, M. (1991). *An assessment of Botswana preservice teachers' environmental content knowledge, attitude towards environmental education and concern for environmental quality*.

Nations, U. (2012a). *Environmental Performance Review of Albania: Second Review*. New York and Geneva: United Nations

Nations, U. (2012b). National report - Albania. Retrieved June 6, 2015, from https://sustainabledevelopment.un.org/content/documents/1014albanianationalreport.pdf

Negev, M., Sagy, G., Garb, Y., Salzberg, A., & Tal, A. (2008). Evaluating the environmental literacy of Israeli elementary and high school students. *The Journal of Environmental Education, 39*(2), 3-20.

Oluk, S., & Özalp, I. (2007). The teaching of global environmental problems according to the constructivist approach: As a focal point of the problem and the availability of concept cartoons. *Kuram ve Uygulamada Egitim Bilimleri, 7*(2), 881.

Orians, G. H. (1990). Ecological concepts of sustainability. *Environment: Science and Policy for Sustainable Development, 32*(9), 10-39.

Orion, N. (1993). A model for the development and implementation of field trips as an integral part of the science curriculum. *School Science and Mathematics, 93*(6), 325-331.

Orion, N., & Hofstein, A. (1991). The measurement of students' attitudes towards scientific field trips. *Science Education, 75*(5), 513-523.

Orion, N., & Hofstein, A. (1994). Factors that influence learning during a scientific field trip in a natural environment. *Journal of research in science teaching, 31*(10), 1097-1119.

Ökesli, T. (2008). Relationship between primary school students' environmental literacy and selected variables in Bodrum. *Unpublished Master Dissertation, Middle East Technical University, Ankara*.

ÖZTÜRK, G. (2009). *Investigating pre-service teacher's environmental literacy through their epistemological beliefs.* MIDDLE EAST TECHNICAL UNIVERSITY.

Payne, P. G. (1981). *A comparative study of the effects of two outdoor/environmental education instructional approaches on the attitudes and knowledge of selected sixth grade children*: University of Oregon.

Pe'er, S., Goldman, D., & Yavetz, B. (2007). Environmental literacy in teacher training:

attitudes, knowledge, and environmental behavior of beginning students. *The Journal of Environmental Education, 39*(1), 45-59.

Powers, A. L. (2004). Teacher preparation for environmental education: Faculty perspectives on the infusion of environmental education into preservice methods courses. *Journal of Environmental Education, 35*, 3-18.

Pruneau, D., Doyon, A., Langis, J., Vasseur, L., Ouellet, E., McLaughlin, E., . . . Martin, G. (2006). When teachers adopt environmental behaviors in the aim of protecting the climate. *The Journal of Environmental Education, 37*(3), 3-12.

Summers, M., Kruger, C., & Childs, A. (2001). Understanding the science of environmental issues: Development of a subject knowledge guide for primary teacher education. *International Journal of Science Education, 23*(1), 33-53.

Summers, M., Kruger, C., Childs, A., & Mant, J. (2000). Primary school teachers' understanding of environmental issues: An interview study.

Summit, E. (1992). Agenda 21. *The United Nations Programme for Action from Rio*.

Summit, J. (2002). World summit on sustainable development. *Johannesburg Summit. org. nd Web*.

Tikka, P. M., Kuitunen, M. T., & Tynys, S. M. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *The Journal of Environmental Education, 31*(3), 12-19.

Tuncer, G., Ertepinar, H., Tekkaya, C., & Sungur, S. (2005). Environmental attitudes of young people in Turkey: Effects of school type and gender. *Environmental Education Research, 11*(2), 215-233.

Tuncer, G., Sungur, S., Tekkaya, C., & Ertepinar, H. (2004). Environmental attitudes of the 6th grade students from rural and urban areas: a case a study for ankara. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 26*(26).

Tuncer, G., Tekkaya, C., & Sungur, S. (2006). Pre-service teachers' beliefs about sustainable development: Effects of gender and enrollment to an environmental course. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 31*(31).

UN-Johannesburg. (2002). WEHAB Framework Papers. Retrieved June 9, 2015, from http://www.un.org/jsummit/html/documents/wehab_papers.html

UNESCO-UNEP. (1987). UNESCO-UNEP International congress on environmental education and training.

UNESCO. (1975). The Belgrade charter: A framework for environmental education. Retrieved June 7, 2015, from http://unesdoc.unesco.org/images/0001/000177/017772eb.pdf

UNESCO. (1977). International Conference on Environmental Education. *Final Report.* Retrieved June 8, 2015, from http://www.gdrc.org/uem/ee/EE-Tbilisi_1977.pdf

UNESCO. (1997). Declaration of Thessaloniki. *International Conference Environment and Society: Education and Public Awareness for Sustainability*. Retrieved June 9, 2015, from http://unesdoc.unesco.org/images/0011/001177/117772eo.pdf

UNESCO, T. (1978). Intergovernmental Conference on Environmental Education. *Final Report. Paris*.

UNESCO, T. D. (1978). Intergovernmental Conference of Environmental education. *Final Report. Paris*.

United Nations Educational, S., & Organization, C. (2002). Education for Sustainability: From Rio to Johannesburg: Lessons Learnt from a Decade of Commitment: Unesco Paris,, France.

Uzun, N., & SAĞLAM, N. (2005). Sosyo-ekonomik durumun çevre bilinci ve çevre akademik başarısı üzerine etkisi. *Hacettepe Üniversitesi Eğitim Fakültesi*

Dergisi, 29(29).
Van Driel, J. H., Bulte, A. M., & Verloop, N. (2005). The conceptions of chemistry teachers about teaching and learning in the context of a curriculum innovation. *International Journal of Science Education, 27*(3), 303-322.
VARIŞLI, T. (2009). *EVALUATING EIGHTH GRADE STUDENTS'ENVIRONMENTAL LITERACY: THE ROLE OF SOCIO-DEMOGRAPHIC VARIABLES.* MIDDLE EAST TECHNICAL UNIVERSITY.
Watson, S. B. (1991). Cooperative learning and group educational modules: Effects on cognitive achievement of high school biology students. *Journal of research in science teaching, 28*(2), 141-146.
YILDIRIM, N. (2008). *EFFECT OF DESIGNED ENVIRONMENTAL EDUCATION LECTURES ON ENVIRONMENTAL ATTITUDES OF PRIMARY SCHOOL STUDENTS.* MIDDLE EAST TECHNICAL UNIVERSITY.
Yilmaz, O., Boone, W. J., & Andersen, H. O. (2004). Views of elementary and middle school Turkish students toward environmental issues. *International Journal of Science Education, 26*(12), 1527-1546.

Secondary Sources

Abell, S. K. (2007). Research on science teacher knowledge. *Handbook of research on science education*, 1105-1149.
Adamson, R. G. (1973). *Pollution: an ecological approach*: Bellhaven House.
Adkins, C., & Simmons, B. (2002). Outdoor, Experiential, and Environmental Education: Converging or Diverging Approaches? ERIC Digest.
Ajzen, I. (2001). Nature and operation of attitudes. *Annual review of psychology, 52*(1), 27-58.
Apple, M., & Teitelbaum, K. (2001). John Dewey. *Fifty major thinkers on education: From Confucius to Dewey*, 177-182.
Association, B. E. R. (1992). British Educational Research Association Ethical Guidelines: London: Bera.
Ballantyne, R., & Packer, J. (2009). Introducing a fifth pedagogy: Experience-based strategies for facilitating learning in natural environments. *Environmental Education Research, 15*(2), 243-262.
Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of environmental psychology, 27*(1), 14-25.
Bandura, A. (1997). *Self-efficacy: The exercise of control*: Macmillan.
Bass, S., & Dalal-Clayton, B. (2012). *Sustainable development strategies: a resource book*: Routledge.
Başal, H. (2005). Çocuklar İçin Uygulamalı Çevre Eğitimi, İstanbul: Morpa Yayınları.
Bedny, G., & Meister, D. (1999). Theory of activity and situation awareness. *International Journal of cognitive ergonomics, 3*(1), 63-72.
Bell*, D. R. (2005). Environmental learning, metaphors and natural capital 1. *Environmental Education Research, 11*(1), 53-69.
Berelson, B. (1952). Content analysis in communication research.
Berger, I. E. (1997). The demographics of recycling and the structure of environmental behavior. *Environment and Behavior, 29*(4), 515-531.
Biel, A. (2003). Environmental behaviour: changing habits in a social context. *Individual and structural determinants of environmental practice*, 11-25.

Bloom, B. S. (1974). *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook 1-2*: Longmans: McKay.

Borden, R. J. (1984). Psychology and ecology: Beliefs in technology and the diffusion of ecological responsibility. *The Journal of Environmental Education, 16*(2), 14-19.

Bossel, H. (1999). *Indicators for sustainable development: theory, method, applications*: International Institute for Sustainable Development Winnipeg.

Botkin, D. B., Keller, E. A., & Rosenthal, D. B. (2012). *Environmental science*: Wiley.

Bögeholz, S. (2006). Nature experience and its importance for environmental knowledge, values and action: Recent German empirical contributions. *Environmental Education Research, 12*(1), 65-84.

Brandon, P. S., & Lombardi, P. (2010). *Evaluating sustainable development in the built environment*: John Wiley & Sons.

Bransford, J. D., & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of research in education*, 61-100.

Braus, J. A., & Wood, D. (1993). Environmental Education in the Schools: Creating a Program that Works! Manual M0044.

Breiting, S. R., & Mogensen, F. (1999). Action competence and environmental education. *Cambridge Journal of Education, 29*(3), 349-353.

Brennan, A. (1994). Environmental literacy and educational ideal. *Environmental values*, 3-16.

Brink, P. J. (1991). Issues of reliability and validity. *Qualitative nursing research: A contemporary dialogue*, 164-186.

Carlson, R. (1956). *The Sense of Wonder*: Harcourt, Brace, Jovanovich.

Carr, W., & Kemmis, S. (2003). *Becoming critical: education knowledge and action research*: Routledge.

Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *The Journal of Environmental Education, 29*(3), 11-21.

Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research, 13*(4), 437-452.

Cherrett, J. M., & Bradshaw, A. D. (1989). *Ecological concepts: the contribution of ecology to an understanding of the natural world*: Blackwell Scientific Publications Oxford.

Chi Kin Lee, J., & Williams, M. (2001). Researching environmental education in the school curriculum: An introduction for students and teacher researchers. *International Research in Geographical and Environmental Education, 10*(3), 218-244.

Chung, Y.-L., & Son, D.-H. (2000). Effects of Cooperative Learning Strategy on Achievement and Science Learning Attitudes in Middle School Biology. *Journal of the Korean Association for Research in Science Education, 20*(4), 611-623.

Clair, R. S. (2003). Words for the world: Creating critical environmental literacy for adults. *New directions for adult and continuing education, 2003*(99), 69-78.

Cohen, L., Manion, L., & Morrison, K. (2000). Action research. *Research methods in education (5th ed.), eds. L. Cohen, L. Manion, and K. Morrison. London: Routledge-Falmer*.

Combes, B. P. (2005). The United Nations decade of education for sustainable development (2005–2014): Learning to live together sustainably. *Applied*

Environmental Education and Communication, 4(3), 215-219.
Cook, S. W., & Berrenberg, J. L. (1981). Approaches to encouraging conservation behavior: A review and conceptual framework. *Journal of Social Issues*.
Cotton, D. (2006). Implementing curriculum guidance on environmental education: The importance of teachers' beliefs. *Journal of Curriculum Studies, 38*(1), 67-83.
Courtenay-Hall, P., & Rogers, L. (2002). Gaps in mind: Problems in environmental knowledge-behaviour modelling research. *Environmental Education Research, 8*(3), 283-297.
Coyle, K. (2005). Environmental literacy in America. *Washington: National Environmental Education & Training Foundation*.
Crompton, J. L., & Sellar, C. (1981). Do outdoor education experiences contribute to positive development in the affective domain? *The Journal of Environmental Education, 12*(4), 21-29.
Cullaj, A., Hasko, A., Miho, A., Schanz, F., Brandl, H., & Bachofen, R. (2005). The quality of Albanian natural waters and the human impact. *Environment International, 31*(1), 133-146.
Cutter-Mackenzie, A., & Smith, R. (2003). Ecological literacy: The 'missing paradigm'in environmental education (part one). *Environmental Education Research, 9*(4), 497-524.
Davidshofer, K., & Murphy, C. (2005). Psychological testing: principles and applications: Upper Saddle River, NJ: Pearson/Prentice Hall.
Day, B. A., & Monroe, M. C. (2000). *Environmental Education & Communication for a Sustainable World: Handbook for International Practitioners*: ERIC.
de Jonge, V. N. (2007). Toward the application of ecological concepts in EU coastal water management. *Marine Pollution Bulletin, 55*(10), 407-414.
Disinger, J., & Roth, C. (1992). Environmental Literacy (ERIC Digest EDO-SE-92-1). *Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education.[ED 351 201]*.
Disinger, J. F., & Roth, C. E. (1992). Environmental Literacy. ERIC/CSMEE Digest.
Dobey, D. C., & Schafer, L. E. (1984). The effects of knowledge on elementary science inquiry teachin. *Science Education, 68*(1), 39-51.
Drake, S. M., & Burns, R. C. (2004). *Meeting standards through integrated curriculum*: ASCD.
Dresner, M., & Gill, M. (1994). Environmental education at summer nature camp. *The Journal of Environmental Education, 25*(3), 35-41.
Dunlap, R., Liere, K., Mertig, A., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.
Durim, K. (2014). Concessions In The Hydropower Sector In Albania–Challenges And Opportunities. *Studies in Business and Economics, 9*(1), 73-80.
El-Fadel, M., Findikakis, A. N., & Leckie, J. O. (1997). Environmental impacts of solid waste landfilling. *Journal of environmental management, 50*(1), 1-25.
Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of advanced nursing, 62*(1), 107-115.
Endsley, M. R., & Robertson, M. M. (2000). Situation awareness in aircraft maintenance teams. *International Journal of Industrial Ergonomics, 26*(2), 301-325.
Ernest, P. (1989). The knowledge, beliefs and attitudes of the mathematics teacher: A model. *Journal of education for teaching, 15*(1), 13-33.

Fensham, P. J. (1978). Stockholm to Tbilisi--The Evolution of Environmental Education. *Prospects: Quarterly Review of Education, 8*(4), 446-455.
Fernández-Manzanal, R., Rodríguez-Barreiro, L., & Carrasquer, J. (2007). Evaluation of environmental attitudes: Analysis and results of a scale applied to university students. *Science Education, 91*(6), 988-1009.
Ferreira, J.-A., & Walker, K. (1997). Education and the Environment: Policy, Trends and the Problems of Marginalisalion [Book Review]. *Australian Journal of Environmental Education, 13,* 95.
Fien, J. (1993). *Education for the environment: Critical curriculum theorising and environmental education*: Deakin University.
Fien, J. (1995). Teaching for a sustainable world: The environmental and development education project for teacher education. *Environmental Education Research, 1*(1), 21-33.
Firestone, J. M., & McElroy, M. W. (2003). *Key issues in the new knowledge management*: Routledge.
Fisher, R. (2005). *Teaching children to think*: Nelson Thornes.
Flaws, M. G., & Meredith, K. L. (2007). A wind shift: Integrating curriculum for education for sustainable development. *New Zealand Geographer, 63*(1), 55-61.
Forman, J., & Damschroder, L. (2008). Qualitative content analysis. *Empirical Research for Bioethics: A Primer. Oxford, UK: Elsevier Publishing*, 39-62.
Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (1993). *How to design and evaluate research in education* (Vol. 7): McGraw-Hill New York.
Fraenkel, J. R., & Wallen, W. (2000). How to design and evaluate educational research: New York: McGraw Hill.
Freire, P., & Freire, A. M. A. (1998). *Pedagogy of the heart*: Bloomsbury Publishing USA.
Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences*: Basic books.
Gay, L. R., Mills, G. E., & Airasian, P. W. (2011). *Educational research: Competencies for analysis and applications*: Pearson Higher Ed.
Gayford, C. (2002). Environmental literacy: Towards a shared understanding for science teachers. *Research in Science & Technological Education, 20*(1), 99-110.
Glick, J. (2007). *The importance of knowledge per se*: ProQuest.
Good, T., & Brophy, J. (2005). Looking in classrooms 9th edn: Longman, New York.
Gore, A. (2006). *An inconvenient truth: The planetary emergency of global warming and what we can do about it*: Rodale.
Gough, A. (2002). Mutualism: A different agenda for environmental and science education. *International Journal of Science Education, 24*(11), 1201-1215.
Gough, A. G. (1997). *Education and the environment: Policy, trends and the problems of marginalisation*: Australian Council for Educational Research.
Govern, J. M., & Marsch, L. A. (2001). Development and validation of the situational self-awareness scale. *Consciousness and cognition, 10*(3), 366-378.
Grossman, P. L. (1990). *The making of a teacher: Teacher knowledge and teacher education*: Teachers College Press, Teachers College, Columbia University.
Grossman, P. L. (1995). Teachers' knowledge. *International encyclopedia of teaching and teacher education, 2*, 20-24.
Gruenewald, D. A. (2003). The best of both worlds: A critical pedagogy of place. *Educational researcher, 32*(4), 3-12.
Hacking, E. B., Scott, W., & Barratt, R. (2007). Children's research into their local

environment: Stevenson's gap, and possibilities for the curriculum. *Environmental Education Research, 13*(2), 225-244.

Harris, J. M. (2000). *Basic principles of sustainable development*: Tufts University Medford, MA.

Hart, E. (1981). Identification of key characteristics of environmental education. *The Journal of Environmental Education, 13*(1), 12-16.

Harvey, G. (1977). *A conceptualization of environmental education.* Paper presented at the A report on the North American regional seminar on environmental education.

Heimlich, J. E., & Ardoin, N. M. (2008). Understanding behavior to understand behavior change: A literature review. *Environmental Education Research, 14*(3), 215-237.

Hema, T., & Malollari, I. (2002). Albanian environmental legal frame and the challenges towards approximation with EU legislation. *Journal of Environmental Protection and Ecology, 3*(2), 282-291.

Hesselink, F., & van Kempen, P. (1999). Environmental Education and Training in Europe, Background Paper for the EU Conference on Environmental Education and Training in Europe, Brussels, May 1999: Brussels, DGXI.

Hicks, D., & Bord, A. (2001). Learning about global issues: why most educators only make things worse. *Environmental Education Research, 7*(4), 413-425.

Hill, M. K. (2010). *Understanding environmental pollution*: Cambridge University Press.

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

Hobson, A. (1993). Ozone and Interdisciplinary Science Teaching--Learning to Address the Things That Count Most. *Journal of College Science Teaching, 23*(1), 33-37.

Hodges, L. (1973). Environmental pollution. Holt, Rinehart and Winston. *Inc. USA.*

Holdgate, M. W., Kassas, M., & White, G. F. (1982). *The World Environment 1972-1982. A report by the United Nations Environment Programme*: Tycooly International Publishing Limited.

Hollweg, K., Taylor, J., Bybee, R., Marcinkowski, T., McBeth, W., & Zoido, P. (2011). Developing a framework for assessing environmental literacy. *Washington, DC: North American Association for Environmental Education*.

Holsti, O. R. (1969). Content analysis for the social sciences and humanities.

Hua, B. (2004). Integrating environmental education into the elementary school curriculum. *Chinese Education & Society, 37*(4), 48-52.

Huhtala, A. (1997). A post-consumer waste management model for determining optimal levels of recycling and landfilling. *Environmental and Resource Economics, 10*(3), 301-314.

Hungerford, H., & Peyton, R. (1994). *Procedures for developing an environmental education curriculum (revised): a discussion guide for UNESCO training seminars on environmental education*: Unesco, Environmental Education Unit, Science and Environmental Education Section, Division for the Renovation of Educational Curricula and Structures.

Hungerford, H., Peyton, R. B., & Wilke, R. J. (1980). Goals for curriculum development in environmental education. *The Journal of Environmental Education, 11*(3), 42-47.

Hungerford, H. R. (1989). A Prototype Environmental Education Curriculum for the

Middle School. A Discussion Guide for Unesco Training Seminars on Environmental Education. Environmental Education Series 29.
Hungerford, H. R. (2009). Environmental Education (EE) for the 21st century: Where have we been? Where are we now? Where are we headed? *The Journal of Environmental Education, 41*(1), 1-6.
Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8-21.
Jackson, P. W. (1992). Conceptions of curriculum and curriculum specialists. *Handbook of research on curriculum*, 3-40.
Jensen, B. B. (2002). Knowledge, action and pro-environmental behaviour. *Environmental Education Research, 8*(3), 325-334.
Jensen, B. B., & Schnack, K. (2006). The action competence approach in environmental education: Reprinted from Environmental Education Research (1997) 3 (2), pp. 163–178. *Environmental Education Research, 12*(3-4), 471-486.
Jeske, W. (1978). Toward an action plan: a report on the Tbilsi conference on environnmental education: Washington. *DC, Federal Interagency Committee on Education, US Department of Health, Education and Welfare*.
Johnson, C. Y., Bowker, J. M., & Cordell, H. K. (2004). Ethnic variation in environmental belief and behavior an examination of the new ecological paradigm in a social psychological context. *Environment and Behavior, 36*(2), 157-186.
Kaiser, F. G., & Fuhrer, U. (2003). Ecological behavior's dependency on different forms of knowledge. *Applied Psychology, 52*(4), 598-613.
Kane, L. (2004). Educators, learners and active learning methodologies. *International Journal of lifelong education, 23*(3).
Kellert, S. R. (1998). A National Study of Outdoor Wilderness Experience.
Kennet, W. (1972). The Stockholm Conference on the Human Environment. *International Affairs (Royal Institute of International Affairs 1944-),* 33-45.
Klein, E. S., & Merritt, E. (1994). Environmental education as a model for constructivist teaching. *The Journal of Environmental Education, 25*(3), 14-21.
Knapp, D., & Poff, R. (2001). A qualitative analysis of the immediate and short-term impact of an environmental interpretive program. *Environmental Education Research, 7*(1), 55-65.
Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239-260.
Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into practice, 41*(4), 212-218.
Krippendorff, K. (2012). *Content analysis: An introduction to its methodology*: Sage.
Krug, E. C., & Frink, C. R. (1983). Acid rain on acid soil: A new perspective. *Science(Washington), 217*(4610), 520-525.
Kurt, H. (2004). Gelişmekte Olan Ülkelerde Çevre Sorunlarının Nitelikleri ve Uygulanan Çevre Koruma Stratejileri. *Çevre Sorunlarına Çağdaş Yaklaşımlar, Beta Basım AŞ, İstanbul*.
Landers, P., Naylon, M., & Drewes, A. (2002). *Environmental literacy scope and sequence: providing a systems approach to environmental education in Minnesota*: Minnesota Office of Environmental Assistance.
Langton, S. (1990). Citizen participation and citizenship education for the 21st century. *Citizenship for the 21st century*, 297-310.

Lasswell, H. D. (1948). The structure and function of communication in society. *The communication of ideas, 37*, 215-228.
Lee, N. R., & Kotler, P. (2011). *Social marketing to protect the environment: What works*: Sage.
Leinhardt, G. (1992). What research on learning tells us about teaching. *Educational Leadership, 49*(7), 20-25.
Levenson, H. (1972). *Locus of control and other cognitive correlates of involvement in anti-pollution activities.*
Lewins, A., Taylor, C., & Gibbs, G. (2005). What is qualitative data analysis (QDA). *Online QDA. Online: onlineqda. hud. ac. uk/Intro_QDA/what_ is_qda. php.{Accessed 19 July 2008}.*
Limón, M. (2001). On the cognitive conflict as an instructional strategy for conceptual change: A critical appraisal. *Learning and instruction, 11*(4), 357-380.
Littledyke, M. (2008). Science education for environmental awareness: approaches to integrating cognitive and affective domains. *Environmental Education Research, 14*(1), 1-17.
Liu, S.-T., & Kaplan, M. S. (2006). An intergenerational approach for enriching children's environmental attitudes and knowledge. *Applied Environmental Education and Communication, 5*(1), 9-20.
Lorey, D. E. (2002). *Global environmental challenges of the twenty-first century: resources, consumption, and sustainable solutions*: Rowman & Littlefield Publishers.
Loughland, T., Reid, A., Walker, K., & Petocz, P. (2003). Factors influencing young people's conceptions of environment. *Environmental Education Research, 9*(1), 3-19.
Mackenzie, A. A., & White, R. T. (1982). Fieldwork in geography and long-term memory structures. *American Educational Research Journal, 19*(4), 623-632.
Madsen, P. (1996). What can universities and professional schools do to save the environment. *Earth Summit Ethics: Toward a Reconstructive Postmodern Philosophy of Environmental Education. Albany State Univer. of New York Press, Albany, NY*, 71-91.
Maduewesi, E. J. (2003). *Emergent curriculum issues: how are the teachers coping?* Paper presented at the FINAL REPORT OF THE SEMINAR/WORKSHOP HELD IN LAGOS, NIGERIA, 12–16 NOVEMBER 2001 RAPPORT FINAL DU SÉMINAIRE/ATELIER TENU À LAGOS, NIGÉRIA, 12–16 NOVEMBRE 2001.
Magnusson, S., Krajcik, J., & Borko, H. (1999). Nature, sources, and development of pedagogical content knowledge for science teaching *Examining pedagogical content knowledge* (pp. 95-132): Springer.
Manfredo, M. J. (2008). *Who cares about wildlife?* : Springer.
Marcinkowski, T. (1991). The relationship between environmental literacy and responsible environmental behavior in environmental education. *Methods and techniques for evaluating environmental education*.
Marcinkowski, T. J. (1988). *An analysis of correlates and predictors of responsible environmental behavior*.
Marcinkowski, T. J. (2004). *Using a logic model to review and analyze an environmental education program*: North American Association for Environmental Education.
McCrea, E. J. (2006). The Roots of Environmental Education: How the Past Supports

the Future. *Environmental Education and Training Partnership (EETAP)*.
McGuire, W. J. (1986). The vicissitudes of attitudes and similar representational constructs in twentieth century psychology. *European journal of social psychology, 16*(2), 89-130.
McKechnie, G. E. (1977). The environmental response inventory in application. *Environment and Behavior, 9*(2), 255-276.
McKenzie-Mohr, D., Nemiroff, L. S., Beers, L., & Desmarais, S. (1995). Determinants of responsible environmental behavior. *Journal of Social Issues, 51*(4), 139-156.
McKeown, R. (2002). Progress has been made in education for sustainable development. *Applied Environmental Education and Communication: An International Journal*, *1*(1), 21-23.
Meadows, D. H. (1989). *Harvesting one hundredfold: Key concepts and case studies in environmental education*: United Nations Environment Programme.
Metaj, M. (2007). Biodiversity and the Protected Areas System in Albania. *Biodiversity, 8*(3), 3-10.
Meyers, R. B. (2006). Environmental learning: reflections on practice, research and theory. *Environmental Education Research, 12*(3-4), 459-470.
Millan, D. A. (1995). Field Trips: Maximizing the Experience.
Mobley, C., Vagias, W. M., & DeWard, S. L. (2009). Exploring additional determinants of environmentally responsible behavior: The influence of environmental literature and environmental attitudes. *Environment and Behavior*.
Moon, J. (2007). *Critical thinking: An exploration of theory and practice*: Routledge.
Morgan, D. L. (2006). Connected contributions as a motivation for combining qualitative and quantitative methods. *Applying qualitative and mixed methods in aging and public health research. Washington, DC: American Public Health Association*.
Morgil, İ., Yılmaz, A., & Cingör, N. (2002). Fen eğitiminde çevre ve çevre koruma projesi hazırlamasına yönelik çalışma. *V. Ulusal Fen bilimleri ve Matematik Eğitimi Kongresi Bildiriler Kitabı*.
Morrone, M., Mancl, K., & Carr, K. (2001). Development of a metric to test group differences in ecological knowledge as one component of environmental literacy. *The Journal of Environmental Education, 32*(4), 33-42.
Moseley, C. (2000). Teaching for environmental literacy. *The Clearing House, 74*(1), 23.
Munson, B. H. (1994). Ecological misconceptions. *The Journal of Environmental Education, 25*(4), 30-34.
NAAEE. (2001). Using environment-based education to advance learning skills and character development. Washington, D.C.
NAAEE. (2004). Excellence in environmental education: Guidelines for learning (K-12).
Nagel, M. (2005). Constructing Apathy: How Environmentalism and Environmental Education May Be Fostering'Learned Hopelessness' in Children. *Australian Journal of Environmental Education, 21*, 71.
Nair, I., Jones, S., & White, J. (2002). A curriculum to enhance environmental literacy. *Journal of Engineering Education, 91*(1), 57-67.
Neal, P., & Palmer, J. (2003). *The handbook of environmental education*: Routledge.
Neuendorf, K. A. (2002). *The content analysis guidebook*: Sage.
Novak, J. D. (2010). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*: Routledge.

O'Donoghue, R. (2001). *Environment and Active Learning in OBE: NEEP Guidelines for Facilitation and Assessing Active Learning in OBE*: publisher not identified.
O'Donoghue, R., & Russo, V. (2004). Emerging patterns of abstraction in environmental education: A review of materials, methods and professional development perspectives. *Environmental Education Research, 10*(3), 331-351.
OECD. (2010). *PISA 2009 Assessment Framework: Key Competencies in Reading, Mathematics and Science*: OECD Pub.
Olli, E., Grendstad, G., & Wollebaek, D. (2001). Correlates of environmental behaviors bringing back social context. *Environment and Behavior, 33*(2), 181-208.
Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*: Suny Press.
Owens, M. A. (2000). The environmental literacy of urban middle school teachers.
Ökmen, M. (2004). Politika ve Çevre. *Çevre Sorunlarına Çağdaş Yaklaşımlar, Beta Yayınları, Yayın*(1483), 327-368.
Özdilek, H. (2004). Hava, su ve toprak kirliliği. *Çevre Sorunlarına Çağdaş Yaklaşımlar*.
Palmberg, I. E., & Kuru, J. (2000). Outdoor activities as a basis for environmental responsibility. *The Journal of Environmental Education, 31*(4), 32-36.
Palmer, J. (2002). *Environmental education in the 21st century: Theory, practice, progress and promise*: Routledge.
Palmer, J. A. (1998). *Environmental education in the 21st century*. London: Creative Print and Design.
Palonsky, S. B. (1993). A Knowledge Base for Social Studies Teachers. *International Journal of Social Education, 7*(3), 7-23.
Pande, A. (2001). Environmental education in rural central Himalayan schools. *The Journal of Environmental Education, 32*(3), 47-53.
Pedersen, D. M. (1999). Dimensions of environmental competence. *Journal of environmental psychology, 19*(3), 303-308.
Peterson, N. J. (1982). *Developmental variables affecting environmental sensitivity in professional environmental educators*.
Peyton, R. B., & Miller, B. A. (1980). Developing an internal locus of control as a prerequisite to environmental action taking. *CURRENT ISSUES VI, 400*, 193.
Plenary, U. (1992). 'Promoting education, public awareness and training'. *Agenda, 21*.
Polit, D. F., & Beck, C. T. (2004). *Nursing research: Principles and methods*: Lippincott Williams & Wilkins.
Qiriazi, P., & Sala, S. (2000). *Environmental problems of Albania*: Springer.
Ramey, L. K. (2008). A Study of Early Environmental Education Experiences: Can We Legislate Concern and Understanding of the Natural World? *Online Submission*.
Raymond, C. M., Fazey, I., Reed, M. S., Stringer, L. C., Robinson, G. M., & Evely, A. C. (2010). Integrating local and scientific knowledge for environmental management. *Journal of environmental management, 91*(8), 1766-1777.
Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research, 7*(3), 207-320.
Robinson, N. A., Hassan, P., & Burhenne-Guilmin, F. (1993). *Agenda 21 & the UNCED proceedings* (Vol. 4): Oceana Publications New York.
Robottom, I. M., & Hart, E. P. (1993). *Research in environmental education: Engaging the debate*: Deakin University.
Roth, C. E. (1992). Environmental Literacy: Its Roots, Evolution and Directions in the 1990s.
Rusinko, C. A. (2010). Integrating sustainability in higher education: a generic matrix.

International Journal of Sustainability in Higher Education, 11(3), 250-259.
Sahlberg, P., & Boce, E. (2010). Are teachers teaching for a knowledge society? *Teachers and Teaching: theory and practice, 16*(1), 31-48.
SALLAKU¹, F., HUQI, B., TOTA, O., MEMA, M., FORTUZI, S., & JOJIÇ, E. (2009). DYNAMICS OF LAND-USE AND LAND-COVER CHANGE IN ALBANIA: ENVIRONMENTAL CONSEQUENCES AND POLICY RESPONSE DINAMIKA E NDRYSHIMEVE TE PERDORIMIT TE TOKES DHE MBULESES BIMORE NE SHQIPERI: KONSEGUCENCAT MJEDISORE DHE REAGIMET POLITIKE. *Research Journal of Agricultural Science, 41*, 2.
Sandelowski, M. (2000). Focus on research methods-whatever happened to qualitative description? *Research in nursing and health, 23*(4), 334-340.
Santamaría, J., & Toranzos, G. A. (2003). Enteric pathogens and soil: a short review. *International microbiology, 6*(1), 5-9.
Saville-Troike, M. (2008). *The ethnography of communication: An introduction* (Vol. 14): John Wiley & Sons.
Schläppi, E., Vyborny, Z., Simaku, S., & Shutina, D. (2009). Supporting regional development in Northern Albania. *Feasibility study for a joint programme, commissioned by Swiss Cooperation and Austrian Development Cooperation*.
Schmieder, A. A. (1977). The nature and philosophy of environmental education: Goals and objectives. *Trends in environmental education*, 23-34.
Schneider, S. H. (1997). Defining and teaching environmental literacy. *Trends in ecology & evolution, 12*(11), 457.
Schoenfeld, C. (1969). What's New About Environmental Education? *Environ Educ*.
Scholz, R. W., & Binder, C. R. (2011). *Environmental literacy in science and society: from knowledge to decisions*: Cambridge University Press.
Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Franěk, M. (2005). Values and their relationship to environmental concern and conservation behavior. *Journal of cross-cultural psychology, 36*(4), 457-475.
Sector, U. E. (2005). United Nations Decade of Education for Sustainable Development (2005-2014): International Implementation Scheme. *United Nations Educational, Scientific and Cultural Organisation (UNESCO), Paris, France*.
Seyfang, G. (2003). Environmental mega-conferences—from Stockholm to Johannesburg and beyond. *Global Environmental Change, 13*(3), 223-228.
Shepardson, D. P. (2005). Student ideas: What is an environment? *The Journal of Environmental Education, 36*(4), 49.
Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard educational review, 57*(1), 1-23.
Siche, J., Agostinho, F., Ortega, E., & Romeiro, A. (2008). Sustainability of nations by indices: Comparative study between environmental sustainability index, ecological footprint and the emergy performance indices. *Ecological Economics, 66*(4), 628-637.
Simmons, D. (1995). Developing a framework for national environmental education standards [Working paper]. *The NAAEE standards project: Papers on the development of environmental education standards*, 9-58.
Simmons, D. (2000). Guidelines for the Initial Preparation of Environmental Educators. *Rock Springs, GA: NAAEE*.
Skanavis, C. (2001). *Assessing the environmental values of Greek citizens.* Paper presented at the Proceedings of Symposium: Sustainable Development and a New System of Societal Values, Schloí Seggau, Leibnitz, Austria.

Smith-Sebasto, N. (1992). The revised perceived environmental control measure: a review and analysis. *The Journal of Environmental Education, 23*(2), 24-33.
Smith, E. R., & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and social psychology review, 4*(2), 108-131.
Smith, G. A. (2007). Place-based education: Breaking through the constraining regularities of public school. *Environmental Education Research, 13*(2), 189-207.
Smith, G. A., & Sobel, D. (2014). *Place-and community-based education in schools*: Routledge.
Smith, K., & Hancock, P. (1995). Situation awareness is adaptive, externally directed consciousness. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 37*(1), 137-148.
Smith, R. L., Smith, T. M., Hickman, G. C., & Hickman, S. M. (2006). *Elements of ecology*: Benjamin Cummings.
Staniskis, J. K., & Stasiskiene, Z. (2006). An integrated approach to environmental education and research: a case study. *Clean Technologies and Environmental Policy, 8*(1), 49-58.
Stanton, N. A., Chambers, P. R., & Piggott, J. (2001). Situational awareness and safety. *Safety science, 39*(3), 189-204.
Stapp, W. B. (1969). The concept of environmental education. *Environmental Education, 1*(1), 30-31.
Steele, F. (1980). Defining and developing environmental competence. *Advances in experimental social processes, 2*, 225-244.
Sterling, S. (1992). *Coming of Age: A short history of Environmental Education (to 1989)*: National Association for Environmental Education Walsall.
Sterling, S. (2004). Higher education, sustainability, and the role of systemic learning *Higher education and the challenge of sustainability* (pp. 49-70): Springer.
Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407-424.
Stern, P. C., Dietz, T., Abel, T. D., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review, 6*(2), 81.
Stevenson, R. B. (1993). Becoming compatible: Curriculum and environmental thought. *The Journal of Environmental Education, 24*(2), 4-9.
Stevenson, R. B. (2007). Schooling and environmental/sustainability education: From discourses of policy and practice to discourses of professional learning. *Environmental Education Research, 13*(2), 265-285.
Sward, L. L., & Marcinkowski, T. (2005). Environmental sensitivity: A review of the research, 1980-1998. *HUNGERFORD, Harold H.; BLUHM, William J.; VOLK, Trudi L,* 301-312.
ŞAHİN, N. F., Cerrah, L., Arzu, S., & Şahin, B. (2004). Yüksek öğretimde öğrenci merkezli çevre eğitimi dersine yönelik bir uygulama. *Gazi Eğitim Fakültesi Dergisi, 24*(3).
Şimşekli, Y. (2001). Bursa'da "Uygulamalı çevre eğitimi" projesine seçilen okullarda yapılan etkinliklerin okul yöneticisi ve görevli öğretmenlerin katkısı yönünden değerlendirilmesi. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi, 14*(1), 73-84.
Tambyah, M. (2008). Will They Know Enough?: Pre-Service Primary Teachers' Knowledge Base For Teaching Integrated Social Sciences. *Australian Journal of*

Teacher Education, *33*(6), 4.

Tanaka, H. (2000). Environmental chemistry education for the 21st century. *Journal of the Indian Chemical Society, 77*(11-12), 531-538.

Tanner, C. (1999). Constraints on environmental behaviour. *Journal of environmental psychology, 19*(2), 145-157.

Tarrant, M. A., & Cordell, H. K. (1997). The effect of respondent characteristics on general environmental attitude-behavior correspondence. *Environment and Behavior, 29*(5), 618-637.

Taskin, O. (2003). Environmental Education: New Era for Science Education.

Thapa, B. (1999). Environmentalism: The relation of environmental attitudes and environmentally responsible behaviors among undergraduate students. *Bulletin of Science, Technology & Society, 19*(5), 426-438.

Thomas, J. W. (2000). A review of research on project-based learning.

Thompson, P. J. (1997). *Environmental Education for the 21st Century: International and Interdisciplinary Perspectives*: ERIC.

Thornton, S. J. (2001). Educating the educators: Rethinking subject matter and methods. *Theory into practice, 40*(1), 72-78.

Tilbury, D. (1994). *Environmental education research: Resolving the crucial curriculum question for environmental education in the 21st Century.* Paper presented at the International Conference on Environmental Education. Hong Kong.

Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research, 1*(2), 195-212.

Tirana County. (2015). from Wikipedia, The Free Encyclopedia. https://en.wikipedia.org/w/index.php?title=Tirana_County&oldid=673291794

Tobin, K., & Fraser, B. J. (1989). Case studies of exemplary science and mathematics teaching. *School Science and Mathematics, 89*(4), 320-334.

Todt, D. E. (1995). *An investigation of the environmental literacy of teachers in South-Central Ohio using the Wisconsin Environmental Literacy Survey, concept mapping and interviews.* The Ohio State University.

Tressel, G. W. (1980). The role of museums in science education. *Science Education, 64*(2), 257-260.

Turkeshi, E. (2014). Criminalizing Waste Management Activities in Albania in the Light of the European Union Legislation. *European Journal of Crime, Criminal Law and Criminal Justice, 22*(1), 79-99.

Van Huylenbroek, G., Mondelaers, K., Aertsens, J., Aertsens, J., Verbeke, W., & Van Huylenbroeck, G. (2009). Personal determinants of organic food consumption: a review. *British Food Journal, 111*(10), 1140-1167.

Van Matre, S. (1990). *Earth education: A new beginning*: ERIC.

Van Petegem, P., Blieck, A., & Van Ongevalle, J. (2007). Conceptions and awareness concerning environmental education: A Zimbabwean case-study in three secondary teacher education colleges. *Environmental Education Research, 13*(3), 287-306.

Vesilind, P. A., Peirce, J. J., & Weiner, R. F. (2013). *Environmental Pollution and Control*: Elsevier.

Vlek, C., & Steg, L. (2007). Human Behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics. *Journal of Social Issues, 63*(1),

1-19.
Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*: Harvard university press.
Wackernagel, M. M. (2005). Ecological Footprints.
Wallen, N. E., & Fraenkel, J. R. (2001). *Educational research: A guide to the process*: Psychology Press.
Wallington, T. J., Srinivasan, J., Nielsen, O. J., & Highwood, E. J. (2004). Greenhouse gases and global warming. *Environmental and Ecological Chemistry. Encyclopedia of Life Support Systems (EOLSS), Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford, UK,[http://www. eolss. net]*.
Wals, A. (2012). Learning our way out of un-sustainability: the role of environmental education. *Oxford Handbook on Environmental and Conservation Psychology*.
Wattchow, B., & Brown, M. (2011). *A pedagogy of place: Outdoor education for a changing world*: Monash University Publishing.
Wood, D. (1998). *How children think and learn: The social contexts of cognitive development*: Blackwell Publishing.
Woodhouse, J. L., & Knapp, C. E. (2000). Place-Based Curriculum and Instruction: Outdoor and Environmental Education Approaches. ERIC Digest.
Woolfolk Hoy, A., & Davis, H. (2006). Teacher self-efficacy and its influence on the achievement of adolescents. *Self-efficacy beliefs of adolescents*, 117-138.
Xiao-dong, K., Guang-jun, L., Qing, W., Lin, Y., & Hui-feng, X. (2007). *Application Research of Ecological Footprint: Time Sequence and Comparative Analysis of Selected Chinese Cities*. Paper presented at the International Ecological Footprint Conference, Cardiff, UK.
Yaron, B., Calvet, R., & Prost, R. (1996). *Soil pollution: processes and dynamics*: Springer Science & Business Media.
Yıldırım, U., & Göktürk, İ. (2004). Sürdürülebilir Kalkınma. *Editörler Mehmet C. Marın, Uğur Yıldırım, Çevre Sorunlarina Çağdaş Yaklaşimlar,-Ekolojik, Ekonomik, Politik ve Yönetsel Perspektifler, Beta Basın Yayım, 1*, 449-488.
Zaganjori, P. X. (2014). Environmental Impact Assessment and the legal reform in Albania. Retrieved June 10, 2015, from http://www.gjykataelarte.gov.al/web/The_Speech_of_Chief_Justice_Prof_Dr_Xhezair_Zaganjori_held_at_the_European_Forum_of_Justices_for_the_Environment_organised_by_the_Hungarian_Supre_2250_2.php
Zdruli, P. (2005). Soil survey in Albania. *Soil Resources of Europe. 2nd edn. European Soil Bureau Research Report*(9).
Zelezny, L. C., Chua, P.-P., & Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues, 56*(3), 443-458.

LIST OF APPENDICES

Appendix A: Permission from Tirana Country (DAR TIRANË QARK)

REPUBLIKA E SHQIPERISË
MINISTRIA E ARSIMIT
DHE SPORTIT
DREJTORIA ARSIMORE RAJONALE E QARKUT TIRANË
DAR
QARKU

Nr. 611 Prot. Tiranë, më 10.03.2015

Lënda : Aprovim për pyetësorin "Ndërgjegjësim Mjedisor" në klasat e 8-ta dhe të 9-ta nga Medreseja e Tiranës.

Drejtuar : Drejtorive të shkollave 9-vjecare DAR qarku Tiranë

Mbështetur në kërkesën e Z.Nihat Aksu, datë 09.03.2015, për organizimin e pyetësorit "Ndërgjegjësim Mjedisor" në të gjitha shkollat 9- vjeçare të qarkut për nxënësit e klasave të 8-ta dhe të 9-ta në lëndën e Kimisë , në kuadër të anketimit që Z.Nihat do të organizoj, DAR qarku Tiranë miraton dhe mbështet realizimin e këtij anketimi. Drejtoritë të bejnë të mundur realizimin e anketimit.

Realizimi i veprimtarive të mesipërme të koordinohet nga drejtoritë e shkollave.

DREJTOR

Eglantina METANI

REPUBLIKA E SHQIPERISË DREJTORIA ARSIMORE RAJONALE QARKU TIRANË

Adresa :Rruga " Aleksandër Moisiu"
Tel: +355 4 379 948

e_mail: dar@darqt.edu.al
website: www.darqt.edu.al

Faqe 1 nga 1

Appendix B: Permission from Tirana City (DAR TIRANË QYTET)

From: **DAR Tirana** <dartirana@yahoo.com>
Date: 2015-04-15 9:42 GMT+02:00
Subject: Njoftim
To: Bilbil Isufaj , Shyqyri Peza , 4 Deshmoret , Kongresi i Lushnjes , Kosova, 1 Maji , Elmaz Lala, Sabaudin Gabrani 7-9 , Astasi Keri , Fan Noli , GjFishta Faik Maqellara , Entela 1 Maji , Androkli Kostallari 1-6 , Sabaudin Gabrani 1-6 , Ibrahim Brahja , Koreografike , Mustafa Greblleshi , Ali Demi , Lasgush Poradeci , Vasil Shanto , Bajram Curri, Emin Duraku , Qemal Ataturk , Gjergj Fishta , Misto Mame , Pal Engjelli , Murat Toptani , At Zef Pllumi , Edith Durham , Qazim Turdiu , Luigj Gurakuqi , Skender Luarasi , Naim Frasheri , Deshmoret e Lirise , Kongresi i Manastirit , Kol Jakova , Kushtrimi i Lirise , Lidhja e Prizrenit , Mihal Grameno , Musine Kokalari , Niket Dardani , Pjeter Budi , Ramazan Jarani , Skender Caci , Siri Kodra , Servete Maci , Xhezmi Delli , Instituti i nxenesve te verber , Ahmet Gashi , Avni Rustemi , Dora Distria , Dhora Leka , E Kuqe , Gjon Buzuku , Hasan Tahsim , Hasan Vogli , Isa Boletini , Jeronim De Rada , Jordan Misja , 1 Qershori , 26 Nentori , 28 Nentori , 7 Marsi , Instituti qe nuk degjojne , Androkli Kostallari 7-9 , Osman Myderizi , Hasan Prishtina , Konferenca e pezes , Gustav Majer , Anila Alliu
Cc: Jonida Matohiti , Medreseja

Te nderuar drejtues te shkollave 9-vjecare,
Lejohet profesor Nihat Aksu te realizoje temen e diplomes ne shkollat tuaja.
Faleminderit per mirekuptimin

DART
Drejtoria Arsimore Rajonale e Qytetit Tirane
Telefon: 04 22 99 10
Adresa: Rr. Jeronim De Rada
e-mail: dartirana@yahoo.com

Appendix C: Class 8 Environmental Knowledge and Awareness Questionnaire (C8EKAQ) - Albanian

KLASË 8: PYETSORI MBI NJOHURITË MJEDISORE DHE NDËRGJEGJËSIMIN

I dashur nxënës

Ky pyetësor është për nxënësit e klasës së tetë. Më poshtë është lista e pyetjeve, për të ditur nivelin e njohurive mjedisore dhe ndërgjegjësimit tuaj për mjedisin dhe deri në çfarë mase lënda e kimisë ndikon tek ju njohuritë mjedisore dhe ndërgjegjësimin tuaj për mjedisin.

Ky pyetësor është pjesë e tezës së doktoraturës. Unë ju kërkoj juve t'i lexoni me kujdes pyetjet e mëposhtme dhe përgjigjjuni atyre.Dua t'ju kujtoj se suksesi i kësaj pune varet totalisht nga bashkëpunimi juaj i sinqertë.

Ky pyetësor është totalisht anonim dhe nuk do të përdoret asnjë informacion që ju identifikon ju përveç rastit kur ju doni të identifikoheni. Unë ju siguroj se informacioni që ju do të jepni do të mbahet i fshehtë në mënyrë strikte dhe do të përdoret vetëm për kërkime shkencore. Nëse keni pyetje rreth këtij studimi, mund të kontaktoni Nihat Aksu, në e-mailin: nihataksu@gmail.com

Me mirënjohje,

Nihat Aksu

Pjesa A: Këto pyetje janë për ju, ju lutem shënoni zgjidhjen më të përshtatshme. <u>Mos e shënoni emrin.</u>

1. Unë jam një ☐ vajzë ☐ djalë
2. Unë jam …………….. vjeç.

Pjesa B: Pyetjet e mëposhtë janë për disa çështje në lidhje me mjedisin. Ju lutem përgjigjuni vetëm pyetjeve që dini. Mos u shqetësoni: ky nuk është një provim dhe fleta juaj nuk do të vlerësohet me notë. Përgjigjet tuaja do të mbahen të fshehta në mënyrë strikte dhe do të përdoren vetëm për qëllimet e studimeve të temave të doktoraturës.

3. A keni dëgjuar ndonjëherë rreth shiut acid? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shkoni tek pyetja e 4)

☐ Jo (shkoni tek pyetja 13, mos ju përgjigjni pyetjeve 4,5,6,7,8,9,10,11 dhe 12)

4. Çfarë mendoni se është shiu acid? **Ju lutem bëni vetëm një zgjedhje.**

Shiu acid është

☐ përzierja e ujit me përbërje ndotëse, të cilat sjellin shiun acid (pH më pak se 5.6)

☐ shi i kontaminuar i cili përmban gazra të papastra dhe substanca të dëmshme

☐ shi që përmban balte

☐ diçka tjetër

☐ Nuk e di

5. Si mendoni se si krijohet shiu acid? **Ju lutem bëni vetëm një zgjedhje.**

☐ nga përbërjet ndotëse të ajrit të cilët janë të përziera me ujin që egziston në atmosferë dhe prodhojnë acide

☐ nga tymi që lëshojne makinat të cilat përzjehen me shiun.

☐ nga bombat e luftës
☐ diçka tjetër
☐ Nuk e di

6. Cilat janë pasojat e shiut acid tek njerëzit dhe mjedisi? **Ju lutem bëni vetëm një zgjedhje.**

☐ Statujat gërryhen pak nga pak, gjethet e pemëve zverdhen dhe bien në tokë ose uji i liqeneve bëhet acid.
☐ Mjedisi është ndotur dhe mikrobet po shkaktojnë vdekjen e njerëzve
☐ Shiu acid është me pasoja katastrofike për njerëzit sepse ai shkakton mjaft sëmundje
☐ të tjera
☐ Nuk e di

7. A mendoni se shiu acid shfaqet në qytet, në fshat, apo tek të dyja vendet? **Ju lutem bëni vetëm një zgjedhje.**

☐ Qytet
☐ Fshat
☐ Qytet dhe fshat

8. Sa e rëndësishme është çështja e shiut acid për ju personalisht? **Ju lutem bëni vetëm një zgjedhje.**

☐ Shumë e rëndësishme
☐ Tepër e rëndësishme
☐ Jo shumë e rëndësishme
☐ Nuk është fare e rëndësishme

9. Ku e keni mësuar çfarë është "Shiu acid"? **Mund të zgjidhni një ose më shumë alternativa**

☐Nga Televizioni/Radioja
☐Në shkollë
☐Nga Gazeta
☐Nga Revistat/ Lajmet
☐Nga Librat
☐Nga Miqtë/Familja
☐Nga Interneti
☐Në Konferenca/ Seminare
☐Nga media sociale (Facebook, Twitter, Instagram)
☐Nga Grupe për mbrojtjen e mjedisit
☐Të tjera (Ju lutem shkruajeni në ……………………………………….)

10. Akeni zgjedhur përgjigjen "në shkollë" në pyetjen 9? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shko tek pyetja 11)
☐ Jo (shko tek pyetja 13, mos i'u përgjigjni pyetjes 11 dhe 12)

11. Kam dëgjuar për shiun acid në

(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐orët e mësimit të Kimisë
☐orët e mësimit të Historisë

☐orët e mësimit të Fizikës
☐orët e mësimit të Biologjisë
☐orët e mësimit të Gjeografisë
☐ Jo në mësime por në një aktivitet në shkollë
☐orët e mësimeve të tjera (Ju lutem shkruajeni në
…………………………………………………………………………..)

12. Si mësuat për shiun acid në këtë mësim? **(Ju mund të zgjidhni një ose me më shumë se një alternativa)**

☐ Lexova një tekst në libër mësimi
☐ Mësuesi/ja jonë na e ka shpjeguar në klasë
☐ Mësuesi/ja na ka dhënë material për të lexuar dhe për të dëgjuar rreth shiut acid
☐ Unë kam bërë projekt për shiut acid
☐ Ne kemi bërë një eksperiment për shiun acid
☐ Mësuesi/ja na ka treguar një vidjo/programe televizive/me multimedia rreth shiut acid
☐Mësuesi/ja jonë ka organizuar takime/biseda me ekspertë
☐ Mësuesi/ja jonë ka organizuar aktivitete në terren/udhëtime/praktika jashtë shkollës për të shpjeguar shiun acid
☐ Të tjera.(Ju lutem, çfarë tjetër………………………………………………………………….).

13. Ke dëgjuar për " shtresën e ozonit"? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shko tek pyetja 14)
☐ Jo (shko tek pyetja 22, mos i'u përgjigjni pyetjeve 14,15,16,17,18,19,20 dhe 21)

14. Çfarë efekti mendoni se ka shtresa e ozonit? **Ju lutem bëni vetëm një zgjedhje.**

☐ Shtresa e ozonit mbron botën nga gazrat toksike.
☐ Shtresa e ozonit mbron botën nga rrezet ultraviolet.
☐ Shtresa e ozonit mbron botën nga meteorët.
☐Të tjera
☐ Nuk e di

15. Gazi më i fuqishëm i cili shkatërron shtresën e ozonit është:

(Ju lutem bëni vetëm një zgjedhje)

☐ dioksidi i karbonit (CO_2)
☐ kloruret dhe floruret e karbonit (CFC)
☐ azoti (N_2)
☐Të tjera
☐ Nuk e di

16. Nëse gjendja e shtresës së ozonit përkeqësohet:

(Ju lutem bëni vetëm një zgjedhje)

☐ uji do të ndotet më shumë
☐ ajri që ne thithim do të jetë më i ndotur

☐ shumë njerëz do të sëmuren nga kanceri i lëkurës
☐Të tjera
☐ Nuk e di

17. Sa i rëndësishëm është për ju personalisht problemi i çarjes/hollimit së shtresës së ozonit?

(Ju lutem bëni vetëm një zgjedhje)
☐ Shumë i rëndësishëm
☐ Tepër i rëndësishëm
☐ Jo shumë i rëndësishëm
☐ Nuk është fare i rëndësishëm

18. Ku e keni mësuar se çfarë është "Çarja/hollimi i shtresës së Ozonit"? **Mund të zgjidhni një ose më shumë alternativa**

☐Nga Televizioni/Radioja ☐Nga Miqtë/Familja
☐Në shkollë ☐Në Internet
☐Në Gazetë ☐Në Konferenca/ Seminare
☐Në Revista/ Lajme ☐Nga Media sociale (Facebook, Twitter, Instagram)
☐Në Libra ☐Nga Grupe për mbrojtjen e mjedisit
☐Të tjera (Ju lutem shkruajeni në ……………………………………….)

19. Nëse zgjodhe "në shkollë" në pyetjen 18? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shko tek pyetja 20)
☐ Jo (shko tek pyetja 22, mos i'u përgjigjni pyetjes 20 dhe 21)

20. Unë kam dëgjuar për çarjen/hollimin e shtresës së Ozonit në:

(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐orët e mësimit të Kimisë
☐orët e mësimit të Historisë
☐orët e mësimit të Fizikës
☐orët e mësimit të Biologjisë
☐orët e mësimit të Gjeografisë
☐ Jo në mësime,por në një aktivitet në shkollë
☐orët e mësimeve të tjera (Ju lutem shkruajeni në ………………………………………………..)

21. Në ç'mënyre mësuat për çarjen/hollimin e shtresës së Ozonit në këtë mësim? **(Ju mund të zgjidhni një ose me më shumë se një alternativa)**

☐ Duke lexuar një tekst në libër mësimi
☐ Mësuesi/ja jonë ka folur rreth çarjes/hollimit të shtresës së ozonit
☐ Mësuesi/ja na ka dhënë material për të lexuar dhe për të dëgjuar rreth çështjes së ozonit
☐ Mësuesi/ja më ka dhënë mua një projekt rreth çarjes/hollimit të shtresës së ozonit
☐ Mësuesi/ja ka bërë një eksperiment rreth çarjes së shtresës së ozonit
☐ Mësuesi/ja na ka treguar nje video/programe televizive/slide rreth shterimit të ozonit
☐Mësuesi/ja jonë ka organizuar takime/biseda nga ekspertë të ftuar në klasë/shkollë
☐ Mësuesi/ja jonë ka organizuar praktika në terren/udhëtime/aktivitete jashtë shkollës për të

shpjeguar problemin e çarjes së shtresës së ozonit

☐ Të tjera. Ju lutem, shkruajeni çfarë ………………………………………………………………….

22. Keni dëgjuar ndonjëherë për "Efektin Serë"? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shkoni tek pyetja e 23)

☐ Jo (shkoni tek pyetja 30, mos ju përgjigjni pyetjeve 23,24,25,26,27,28 dhe 29)

23. *Shkencëtarët thonë se klima po ndryshon ngadallë dhe kjo është shkaktuar nga "efekti serë". Dihet se disa gaze në atmosferë shkaktojnë "efektin serë". Ato quhen "gazet e efektit serë".*

Cilat prej këtyre mendoni se është gazi kryesor që shkakton "efektin serë". **Ju lutem bëni vetëm një zgjedhje.**

☐ oksigjeni

☐ dioksidi i karbonit

☐ azoti

☐ klor

☐ Nuk e di

24. Dihet se veprimtaria e njeriut prodhon gazra që sjellin efektin serë. Aktivitetet e mëposhtme sjellin rritjen apo uljen e sasisë së këtyre gazeve në amosferë? **Ju lutem bëni nga një zgjedhje për çdo rresht.**

	Rritje	**Ulje**	**Nuk e di**
a) djegia e naftës ose qymyr për karburant	☐	☐	☐
b) mbjellja e pemëve dhe pyjeve	☐	☐	☐
c) përgatitja dhe përdorimi i CFC-ve	☐	☐	☐
d) duke përdorur burime alternative për të përfituar energji ashtu si p.sh energjia diellore dhe erërat	☐	☐	☐
e) përdorimi i motorrëve të makinav	☐	☐	☐

25. Sa të rëndësishëme janë për ju personalisht pasojat e efektit serë?

(Ju lutem bëni vetëm një zgjedhje)

☐ Shumë i rëndësishëm

☐ Tepër i rëndësishëm

☐ Jo shumë i rëndësishëm

☐ Nuk është aspak i rëndësishëm

26. Nga keni mësuar se çfarë është "Efekti Serë"? **Mund të zgjidhni një ose më shumë alternativa**

☐Nga Televizioni/Radioja

☐Në shkollë

☐Në Gazetë

☐Nga Revista/ Lajme

☐Nga Libra

☐Nga Miqtë/Familja

☐Në Internet

☐Në Konferenca/ Seminare

☐Nga Media sociale (Facebook, Twitter, Instagram)

☐Nga Grupet për mbrojtjen e mjedisit

☐Të tjera (Ju lutem shkruajeni në ………………………………………….)

27. Zgjodhët "në shkollë" në pyetjen 26? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shko tek pyetja 28)

☐ Jo (shko tek pyetja 30, mos i'u përgjigjni pyetjes 28 dhe 29)

28. Unë kam dëgjuar rreth efektit serë në

(Ju mund të zgjidhni një ose me më shumë se një alternativa)

☐orët e mësimit të Kimisë

☐orët e mësimit të Historisë

☐orët e mësimit të Fizikës

☐orët e mësimit të Biologjisë

☐orët e mësimit të Gjeografisë

☐ Jo në mësime por në një aktivitet në shkollë

☐orët e mësimeve të tjera (Ju lutem shkruajeni në …………………………………………………………)

29. Në ç'mënyrë mësuat në këtë mësim rreth efektit serë? **(Ju mund të zgjidhni një ose me më shumë se një alternativa)**

☐ Unë kam lexuar tekstin

☐ Mësuesi/ja jonë ka folur rreth efektit serë

☐ Mësuesi/ja na ka dhënë material për të lexuar dhe për të dëgjuar rreth efektit serë

☐ Mësuesi/ja më ka dhënë për të bërë një projekt rreth efektit serë

☐ Mësuesi/ja ka bërë një eksperiment rreth efektit serë

☐ Mësuesi/ja na ka treguar ne vidjo/programe televizive/slajde rreth efektit serë

☐Mësuesi/ja jonë ka organizuar seminare/biseda me ekspertë në klasë

☐ Mësuesi/ja jonë ka organizuar praktikë në terren/udhëtime/aktivitete jashtë shkollës për të shpjeguar efektin serë

☐ Të tjera. Ju lutem, shkruajeni në ………………………………………………………………….

30. Programe për mjedisin që janë zhvilluar në shkollën tuaj jane:

(Mund të zgjidhni një ose më shumë se një alternativë)

☐biseda me ekspertë për mjedisin

☐seminare

☐diskutime

☐konkurse kuiz

☐konkurse esesh

☐eksperimente

☐projekte shkencore

☐tjetër, specifikoje………………………………………………………………

☐asgjë nuk është organizuar

31. A keni marrë pjesë tek ndonjë

a) udhëtim mjedisor? ☐po ☐jo
b) kampe në natyrë? ☐po ☐jo
c) programe pastrimi? ☐po ☐jo
d) aktivitete të tjera jashtë ☐po ☐jo

klase nëse po ju lutem specifikojeni………………………………………………………………………………..

32. Kush mendoni se duhet të ketë përgjegjësinë kryesore për problemeve mjedisore ose ndalimin e përkeqësimit të problemeve?

(Ju lutem bëni një zgjedhje)

☐organizatat ndërkombëtarë (UN)
☐qeveria
☐qeverisja lokale
☐bizneset dhe industritë
☐organizatat për mbrojtjen e mjedisit
☐çdo individ
☐tjetër

Appendix D: Class 8 Environmental Knowledge and Awareness Questionnaire (C8EKAQ) -English

CLASS 8 ENVIRONMENTAL KNOWLEDGE AND AWARENESS QUESTIONNAIRE

Dear Student,

This questionnaire is for class 8 students. Below is the list of questions, to know your environmental knowledge and awareness level and what extent are chemistry subject effective on yours environmental knowledge and awareness.

This questionnaire is part of a doctoral thesis. I request you to read the questionnaire carefully and answer it. I wish to remind you that the successful completion of my research work depends entirely on your sincere co-operation.

The questionnaire is completely anonymous with no identifying information unless you choose to provide it. I assure you that the information that you give will be kept strictly confidential and will be used only for the research work. If you have questions regarding this study, you may contact Nihat Aksu, at e-mail:nihataksu@gmail.com.

Yours faithfully,

Nihat Aksu

Part A: These questions are about you, please mark the appropriate choice. <u>Do not write your name</u>.

1. I am a ☐ boy ☐ girl.
2. I am …………… years old.

Part B: The questions given below are based on some environmental issues. <u>Please answer the questions that only you know</u>. Feel free this is not an exam and your paper will not be marked. Your answers will be held in strict confidentiality and will be used only for the purposes of doctoral thesis study.

3. Have you ever heard about <u>acid rain</u> or not? **Please mark one choice**
   ☐ Yes (go to question 4)
   ☐ No (go to question 13, don’t answer questions 4,5,6,7,8,9,10,11 and 12)

4. What do you think acid rain is? **Please mark one choice**
   Acid rain is
   ☐the combination of the pollutants with water, which gives rain with acids (pH less than 5.6).
   ☐the contaminated rain which contains dirty gases and harmful substances.
   ☐the rain which contains mud.
   ☐Other
   ☐I don’t know

5. How do you think acid rain produced? **Please mark one choice**
   Acid rain is produced

☐from air pollutants which are combined with the water existing in the atmosphere and produce acids.
☐from the car exhausted fumes which are combined with the rain.
☐from the war bombs.
☐Other
☐I don't know

6. What are the consequences of acid rain to human beings and environment? **Please mark one choice**
☐The monuments are eaten into, little by little, the leaves of the trees are turning yellow and fall on the ground or that the lakes are made acidic
☐The environment is being contaminated and the microbes causes people's death
☐The acid rain is disastrous for the human beings since it causes several diseases
☐ Other
☐ I don't know

7. Do you think that the acid rain appears in the city, in the village or in both of them? **Please mark one choice**
☐City
☐Village
☐City and village

8. How important is the issue of acid rain to you personally? **Please mark one choice**
☐ Very important
☐Quite important
☐Not very important
☐Not at all important

9. How have you learned what is "acid rain"? **You may mark one or more than one choice**

Television/Radio☐	Friends/Family☐
Taught at school ☐	Internet☐
Newspapers☐	Conferences/Seminars☐
Magazines/Journals☐	Social Media(Facebook, Twitter,Instagram etc.)☐
Books☐	Environmental Groups☐
Other☐ (Please write in ……………………………….)	

10. Did you mark "taught at school" in question 9? **Please mark one choice**
☐ Yes (go to question 11)
☐ No (go to question 13, don't answer questions 11 and 12)

11. I have heard about acid rain in the
(You may mark one or more than one choice)

Chemistry Lesson ☐	History Lesson ☐	☐Not in a lesson but in a school activity
Physics Lesson ☐	Biology Lesson☐	
Geography Lesson☐	Other Lesson☐ (please write in …………………..)	

12. How have you learned <u>acid rain</u> in this lesson? **You may mark one or more than one choice**

☐ I have read in the textbook.
☐ Our teacher has explained in the class.
☐Our teacher has given reading and learning materials about acid rain.
☐ I have done a project about acid rain.
☐ We have done an experiment about acid rain.
☐ Our teacher has showed us a video/TV program/Slide about acid rain.
☐ Our teacher has organized seminar/ talk by experts.
☐ Our teacher has organized fieldwork/ trip/outdoor activity to teach acid rain.
☐ Other. Please write in …………………………………………………………………..

13. Have you heard of the "ozone layer"? **Please mark one choice**
☐ Yes (go to question 14)
☐ No (go to question 22, don't answer questions 14,15,16,17,18,19,20 and 21)

14. What do you think the ozone layer does? **Please mark one choice**
☐Ozone layer protects the world from toxic gases
☐Ozone layer protects the world from harmful ultraviolet rays
☐Ozone layer protects the world from meteoroids
☐Other
☐I don't know

15. The most effective gas which causes ozone layer destruction is
Please mark one choice
☐carbon dioxide (CO_2)
☐chlorofluorocarbon (CFC)
☐nitrogen (N_2)
☐other
☐I don't know

16. If the ozone layer problem becomes worse,
Please mark one choice
☐there will be more water pollution
☐there will be more air pollution for us to breathe
☐more people will get skin cancer
☐other
☐I don't know

17. How important is the issue of ozone depletion to you personally? **Please mark one choice**
☐ Very important
☐Quite important
☐Not very important
☐Not at all important

18. Where have you heard about Ozone Depletion? **You may mark one or more than one choice**

Television/Radio☐ Friends/Family☐
Taught at school ☐ Internet☐
Newspapers☐ Conferences/Seminars☐
Magazines/Journals☐ Social Media(Facebook, Twitter,Instagram etc.)☐
Books☐ Environmental Groups☐
Other☐ (Please write in ……………………………….)

19. Did you mark "taught at school" in question 18? **Please mark one choice**
☐ Yes (go to question 20)
☐ No (go to question 22, don't answer questions 20 and 21)

20. I have heard about Ozone Depletion in the
(You may mark one or more than one choice)
Chemistry Lesson ☐ History Lesson ☐ ☐ Not in a lesson but in a school activity
Physics Lesson ☐ Biology Lesson☐
Geography Lesson☐ Other lesson☐ (please write in ……………………)

21. How have you heard about Ozone Depletion in this lesson? **You may mark one or more than one choice**
☐ I have read in the textbook.
☐ Our teacher has talked about Ozone Depletion.
☐ Our teacher has given reading and learning materials about Ozone Depletion.
☐ My teacher has given me a project about Ozone Depletion.
☐ Our teacher has done an experiment about Ozone Depletion.
☐ Our teacher has showed us a video/TV program/Slide about Ozone Depletion.
☐ Our teacher has organized seminar/ talk by experts.
☐ Our teacher has organized fieldwork/ trip/outdoor activity to teach Ozone Depletion.
☐ Other. Please write …………………………………………………………………..

22. Have you heard about "Greenhouse effect"? **Please mark one choice**
☐ Yes (go to question 23)
☐ No (go to question 30, don't answer questions 23,24,25,26,27,28 and 29)

23. *Scientists say that the climate is slowly changing and that this is caused by 'the greenhouse effect'. It is known that some gases in the atmosphere are responsible for the 'greenhouse effect'. They are called 'greenhouse gases'.*
Which of the following do you think is the main 'greenhouse gas'? **Please mark one choice**
☐oxygen
☐carbon dioxide
☐nitrogen
☐chlorine
☐I don't know

24. It is known that human activity produces greenhouse gases. Will the following activities tend to increase or decrease the amount of these gases in the atmosphere? **Please mark one choice in each row**

		Increase	decrease	don't know
a)	Burning oil or coal for fuel	☐	☐	☐
b)	Planting trees and forests	☐	☐	☐
c)	Making and using CFCs	☐	☐	☐
d)	Using alternative energy sources such as solar power and wind	☐	☐	☐
e)	Using motor cars	☐	☐	☐

25. How important is the issue of greenhouse effect to you personally? **Please mark one choice**
☐ Very important
☐Quite important
☐Not very important
☐Not at all important

26. How have you learned what is "greenhouse effect"? **You may mark one or more than one choice**

Television/Radio☐ Friends/Family☐
Taught at school ☐ Internet☐
Newspapers☐ Conferences/Seminars☐
Magazines/Journals☐ Social Media(Facebook, Twitter,Instagram etc.)☐
Books☐ Environmental Groups☐
Other☐ (Please write in ……………………………….)

27. Did you mark "taught at school" in question 26? **Please mark one choice**
☐ Yes (go to question 28)
☐ No (go to question 30, don't answer questions 28 and 29)
28. I have heard about greenhouse effect in the
(You may mark one or more than one choice)
Chemistry Lesson ☐ History Lesson ☐ ☐ Not in a lesson but in a school activity
Physics Lesson ☐ Biology Lesson☐
Geography Lesson☐ Other lesson ☐ (please write in ……………………)

29. How have you heard about greenhouse effect in this lesson? **You may mark one or more than one choice**
☐ I have read in the textbook.
☐ Our teacher has talked about greenhouse effect.
☐ Our teacher has given reading and learning materials about greenhouse effect.
☐ My teacher has given me a project about greenhouse effect.
☐ We have done an experiment about greenhouse effect.
☐ Our teacher has showed us a video/TV program/Slide about greenhouse effect.
☐ Our teacher has organized seminar/ talk by experts.
☐ Our teacher has organized fieldwork/ trip/outdoor activity to teach greenhouse effect.
☐ Other. Please write …………………………………………………………………..
30. Environmental programs organized in the school are
(You may mark one or more than one choice)
☐Talk by experts
☐Seminar

☐Discussion
☐Quiz competition
☐Essay competition
☐Experiments
☐Science projects
☐Other, specify…………………………………………..
☐Nothing organized

31. Have you participated any
    a) environmental trip? ☐yes ☐no
    b) nature camps? ☐yes ☐no
    c) cleaning program? ☐yes ☐no
    d) other outdoor activities? ☐yes ☐no

    (If answer of d is yes please specify……)

32. Who do you think should have the main responsibility for tackling environmental problems?
    Please mark one choice
    ☐International organizations (e.g. the UN)
    ☐The national government
    ☐Local government
    ☐Business and industry
    ☐Environmental organizations
    ☐Individuals
    ☐Other

Appendix E: Class 9 Environmental Knowledge and Awareness Questionnaire (C8EKAQ) - Albanian

KLASË 9: PYETSORI MBI NJOHURITË MJEDISORE DHE NDËRGJEGJËSIMIN

I dashur nxënës

Ky pyetësor është për nxënësit e klasës së nëntë. Më poshtë është lista e pyetjeve, për të ditur nivelin e njohurive mjedisore dhe ndërgjegjësimit tuaj për mjedisin dhe deri në çfarë mase lënda e kimisë ndikon tek ju njohuritë mjedisore dhe ndërgjegjësimin tuaj për mjedisin.

Ky pyetësor është pjesë e tezës së doktoraturës. Unë ju kërkoj juve t'i lexoni me kujdes pyetjet e mëposhtme dhe t'ju përgjigjjeni atyre.Dua t'ju kujtoj se suksesi i kësaj pune varet totalisht nga bashkëpunimi juaj i sinqertë.

Ky pyetësor është totalisht anonim dhe nuk do të përdoret asnjë informacion që ju identifikon ju përveç rastit kur ju doni të identifikoheni. Unë ju siguroj se informacioni që ju do të jepni do të mbahet i fshehtë në mënyrë strikte dhe do të përdoret vetëm për kërkime shkencore. Nëse keni pyetje rreth këtij studimi, mund të kontaktoni Nihat Aksu, në e-mailin: nihataksu@gmail.com

Me mirënjohje,
Nihat Aksu

Pjesa A: Këto pyetje janë për ju, ju lutem shënoni zgjidhjen më të përshtatshme. Mos e shënoni emrin.

1. Unë jam një ☐ vajzë ☐ djalë
2. Unë jam .... vjeç.

Pjesa B: Pyetjet e mëposhtë janë për disa çështje në lidhje me mjedisin. Ju lutem përgjigjuni vetëm pyetjeve që dini. Mos u shqetësoni: ky nuk është një provim dhe fleta juaj nuk do të vlerësohet me notë. Përgjigjet tuaja do të mbahen të fshehta në mënyrë strikte dhe do të përdoren vetëm për qëllimet e studimeve të temave të doktoraturës.

3. A keni dëgjuar ndonjëherë rreth shiut acid? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shkoni tek pyetja e 4)
☐ Jo (shkoni tek pyetja 13, mos ju përgjigjni pyetjeve 4,5,6,7,8,9,10,11 dhe 12)

4. Çfarë mendoni se është shiu acid? **Ju lutem bëni vetëm një zgjedhje.**

Shiu acid është
☐ përzierja e ujit me përbërje ndotëse, të cilat sjellin shiun acid (pH më pak se 5.6)
☐ shi i kontaminuar i cili përmban gazra të papastra dhe substanca të dëmshme
☐ shi që përmban balte
☐ diçka tjetër
☐ Nuk e di

5. Si mendoni se si krijohet shiu acid? **Ju lutem bëni vetëm një zgjedhje.**

☐ nga përbërjet ndotëse të ajrit të cilët janë të përziera me ujin që egziston në atmosferë dhe prodhojnë acide
☐ nga tymi që lëshojne makinat të cilat përzjehen me shiun.

☐ nga bombat e luftës
☐ diçka tjetër
☐ Nuk e di

6. Cilat janë pasojat e shiut acid tek njerëzit dhe mjedisi? **Ju lutem bëni vetëm një zgjedhje.**

☐ Statujat gërryhen pak nga pak, gjethet e pemëve zverdhen dhe bien në tokë ose uji i liqeneve bëhet acid.
☐ Mjedisi është ndotur dhe mikrobet po shkaktojnë vdekjen e njerëzve
☐ Shiu acid është me pasoja katastrofike për njerëzit sepse ai shkakton mjaft sëmundje
☐ të tjera
☐ Nuk e di

7. A mendoni se shiu acid shfaqet në qytet, në fshat, apo tek të dyja vendet? **Ju lutem bëni vetëm një zgjedhje.**

☐ Qytet
☐ Fshat
☐ Qytet dhe fshat

8. Sa e rëndësishme është çështja e shiut acid për ju personalisht? **Ju lutem bëni vetëm një zgjedhje.**

☐ Shumë e rëndësishme
☐ Tepër e rëndësishme
☐ Jo shumë e rëndësishme
☐ Nuk është fare e rëndësishme

9. Ku e keni mësuar çfarë është "Shiu acid"? **Mund të zgjidhni një ose më shumë alternativa**

☐Nga Televizioni/Radioja ☐Nga Miqtë/Familja
☐Në shkollë ☐Nga Interneti
☐Nga Gazeta ☐Në Konferenca/ Seminare
☐Nga Revistat/ Lajmet ☐Nga media sociale (Facebook, Twitter, Instagram)
☐Nga Librat ☐Nga Grupe për mbrojtjen e mjedisit
☐Të tjera (Ju lutem shkruajeni në ……………………………………….)

10. Akeni zgjedhur përgjigjen "në shkollë" në pyetjen 9? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shko tek pyetja 11)
☐ Jo (shko tek pyetja 13, mos i'u përgjigjni pyetjes 11 dhe 12)

11. Kam dëgjuar për shiun acid në

(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐orët e mësimit të Kimisë

☐orët e mësimit të Historisë
☐orët e mësimit të Fizikës
☐orët e mësimit të Biologjisë
☐orët e mësimit të Gjeografisë
☐ Jo në mësime por në një aktivitet në shkollë
☐orët e mësimeve të tjera (Ju lutem shkruajeni në ……………………………………………………………………….)

12. Si mësuat për shiun acid në këtë mësim? **(Ju mund të zgjidhni një ose me më shumë se një alternativa)**

☐ Lexova një tekst në libër mësimi
☐ Mësuesi/ja jonë na e ka shpjeguar në klasë
☐ Mësuesi/ja na ka dhënë material për të lexuar dhe për të dëgjuar rreth shiut acid
☐ Unë kam bërë projekt për shiut acid
☐ Ne kemi bërë një eksperiment për shiun acid
☐ Mësuesi/ja na ka treguar një vidjo/programe televizive/me multimedia rreth shiut acid
☐Mësuesi/ja jonë ka organizuar takime/biseda me ekspertë
☐ Mësuesi/ja jonë ka organizuar aktivitete në terren/udhëtime/praktika jashtë shkollës për të shpjeguar shiun acid
☐ Të tjera.(Ju lutem, çfarë tjetër………………………………………………………………..).

13. Ke dëgjuar për “ shtresën e ozonit”? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shko tek pyetja 14)
☐ Jo (shko tek pyetja 22, mos i'u përgjigjni pyetjeve 14,15,16,17,18,19,20 dhe 21)

14. Çfarë efekti mendoni se ka shtresa e ozonit? **Ju lutem bëni vetëm një zgjedhje.**

☐ Shtresa e ozonit mbron botën nga gazrat toksike.
☐ Shtresa e ozonit mbron botën nga rrezet ultraviolet.
☐ Shtresa e ozonit mbron botën nga meteorët.
☐Të tjera
☐ Nuk e di

15. Gazi më i fuqishëm i cili shkatërron shtresën e ozonit është:
(Ju lutem bëni vetëm një zgjedhje)

☐ dioksidi i karbonit (CO_2)
☐ kloruret dhe floruret e karbonit (CFC)
☐ azoti (N_2)
☐Të tjera
☐ Nuk e di

16. Nëse gjendja e shtresës së ozonit përkeqësohet:
(Ju lutem bëni vetëm një zgjedhje)

☐ uji do të ndotet më shumë

☐ ajri që ne thithim do të jetë më i ndotur
☐ shumë njerëz do të sëmuren nga kanceri i lëkurës
☐Të tjera
☐ Nuk e di

17. Sa i rëndësishëm është për ju personalisht problemi i çarjes/hollimit së shtresës së ozonit?

(Ju lutem bëni vetëm një zgjedhje)
☐ Shumë i rëndësishëm
☐ Tepër i rëndësishëm
☐ Jo shumë i rëndësishëm
☐ Nuk është fare i rëndësishëm

18. Ku e keni mësuar se çfarë është "Çarja/hollimi i shtresës së Ozonit"? **Mund të zgjidhni një ose më shumë alternativa**

☐Nga Televizioni/Radioja ☐Nga Miqtë/Familja
☐Në shkollë ☐Në Internet
☐Në Gazetë ☐Në Konferenca/ Seminare
☐Në Revista/ Lajme ☐Nga Media sociale (Facebook, Twitter, Instagram)
☐Në Libra ☐Nga Grupe për mbrojtjen e mjedisit
☐Të tjera (Ju lutem shkruajeni në ……………………………………….)

19. Nëse zgjodhe "në shkollë" në pyetjen 18? **Ju lutem bëni vetëm një zgjedhje.**
☐ Po (shko tek pyetja 20)
☐ Jo (shko tek pyetja 22, mos i'u përgjigjni pyetjes 20 dhe 21)

20. Unë kam dëgjuar për çarjen/hollimin e shtresës së Ozonit në:

(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐orët e mësimit të Kimisë
☐orët e mësimit të Historisë
☐orët e mësimit të Fizikës
☐orët e mësimit të Biologjisë
☐orët e mësimit të Gjeografisë
☐ Jo në mësime,por në një aktivitet në shkollë
☐orët e mësimeve të tjera (Ju lutem shkruajeni në ………………………………………………..)

21. Në ç'mënyre mësuat për çarjen/hollimin e shtresës së Ozonit në këtë mësim? **(Ju mund të zgjidhni një ose me më shumë se një alternativa)**

☐ Duke lexuar një tekst në libër mësimi
☐ Mësuesi/ja jonë ka folur rreth çarjes/hollimit të shtresës së ozonit
☐ Mësuesi/ja na ka dhënë material për të lexuar dhe për të dëgjuar rreth çështjes së ozonit
☐ Mësuesi/ja më ka dhënë mua një projekt rreth çarjes/hollimit të shtresës së ozonit
☐ Mësuesi/ja ka bërë një eksperiment rreth çarjes së shtresës së ozonit

☐ Mësuesi/ja na ka treguar nje video/programe televizive/slide rreth shterimit të ozonit
☐Mësuesi/ja jonë ka organizuar takime/biseda nga ekspertë të ftuar në klasë/shkollë
☐ Mësuesi/ja jonë ka organizuar praktika në terren/udhëtime/aktivitete jashtë shkollës për të shpjeguar problemin e çarjes së shtresës së ozonit
☐ Të tjera. Ju lutem, shkruajeni çfarë ……………………………………………………………….

22. Keni dëgjuar ndonjëherë për “Efektin Serë”? **Ju lutem bëni vetëm një zgjedhje.**

☐ Po (shkoni tek pyetja e 23)
☐ Jo (shkoni tek pyetja 30, mos ju përgjigjni pyetjeve 23,24,25,26,27,28 dhe 29)

23. *Shkencëtarët thonë se klima po ndryshon ngadallë dhe kjo është shkaktuar nga “efekti serë”. Dihet se disa gaze në atmosferë shkaktojnë “efektin serë”. Ato quhen “gazet e efektit serë”.*

Cilat prej këtyre mendoni se është gazi kryesor që shkakton “efektin serë”. **Ju lutem bëni vetëm një zgjedhje.**

☐ oksigjeni
☐ dioksidi i karbonit
☐ azoti
☐ klor
☐ Nuk e di

24. Dihet se veprimtaria e njeriut prodhon gazra që sjellin efektin serë. Aktivitetet e mëposhtme sjellin rritjen apo uljen e sasisë së këtyre gazeve në amosferë? **Ju lutem bëni nga një zgjedhje për çdo rresht.**

	Rritje	**Ulje**	**Nuk e di**
a) djegia e naftës ose qymyr për karburant	☐	☐	☐
b) mbjellja e pemëve dhe pyjeve	☐	☐	☐
c) përgatitja dhe përdorimi i CFC-ve	☐	☐	☐
d) duke përdorur burime alternative për të përfituar energji ashtu si p.sh energjia diellore dhe erërat	☐	☐	☐
e) përdorimi i motorrëve të makinave	☐	☐	☐

25. Sa të rëndësishëme janë për ju personalisht pasojat e efektit serë?

(Ju lutem bëni vetëm një zgjedhje)

☐ Shumë i rëndësishëm
☐ Tepër i rëndësishëm
☐ Jo shumë i rëndësishëm
☐ Nuk është aspak i rëndësishëm

26. Nga keni mësuar se çfarë është “Efekti Serë”? **Mund të zgjidhni një ose më shumë alternativa**

☐Nga Televizioni/Radioja ☐Nga Miqtë/Familja
☐Në shkollë ☐Në Internet

☐Në Gazetë ☐Në Konferenca/ Seminare
☐Nga Revista/ Lajme ☐Nga Media sociale (Facebook, Twitter, Instagram)
☐Nga Libra ☐Nga Grupet për mbrojtjen e mjedisit
☐Të tjera (Ju lutem shkruajeni në ……………………………………….)

27. Zgjodhët "në shkollë" në pyetjen 26? **Ju lutem bëni vetëm një zgjedhje.**
☐ Po (shko tek pyetja 28)
☐ Jo (shko tek pyetja 30, mos i'u përgjigjni pyetjes 28 dhe 29)

28. Unë kam dëgjuar rreth efektit serë në
(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐orët e mësimit të Kimisë
☐orët e mësimit të Historisë
☐orët e mësimit të Fizikës
☐orët e mësimit të Biologjisë
☐orët e mësimit të Gjeografisë
☐ Jo në mësime por në një aktivitet në shkollë
☐orët e mësimeve të tjera (Ju lutem shkruajeni në ………………………………………………………..)

29. Në ç'mënyrë mësuat në këtë mësim rreth efektit serë? **(Ju mund të zgjidhni një ose me më shumë se një alternativa)**
☐ Unë kam lexuar tekstin
☐ Mësuesi/ja jonë ka folur rreth efektit serë
☐ Mësuesi/ja na ka dhënë material për të lexuar dhe për të dëgjuar rreth efektit serë
☐ Mësuesi/ja më ka dhënë për të bërë një projekt rreth efektit serë
☐ Mësuesi/ja ka bërë një eksperiment rreth efektit serë
☐ Mësuesi/ja na ka treguar ne vidjo/programe televizive/slajde rreth efektit serë
☐Mësuesi/ja jonë ka organizuar seminare/biseda me ekspertë në klasë
☐ Mësuesi/ja jonë ka organizuar praktikë në terren/udhëtime/aktivitete jashtë shkollës për të shpjeguar efektin serë
☐ Të tjera. Ju lutem, shkruajeni në ………………………………………………………………….

30. A keni dëgjuar rreth efekteve të dëmshme të baterive në mjedis?
☐ Po (shko tek pyetja 31)
☐ Jo (shko tek pyetja 36, mos i'u përgjigjni pyetjes 31,32,33,34 dhe 35)

31. Nga jeni informuar rreth efekteve të dëmshme të baterive në mjedis?
(Mund të zgjidhni ose më shumë se një alternativa)
☐Nga Televizioni/Radio ☐Nga Miqtë/Familja
☐Në shkollë ☐Në Internet
☐Në Gazetë ☐Në Konferenca/ Seminare
☐Nga Revistat/ Lajmet ☐Nga Media sociale (Facebook, Tëitter, Instagram)

☐Në Libra ☐Nga Grupe për mbrojtjen e mjedisit
☐Të tjera (Ju lutem shkruajeni në ……………………………………………)

32. Zgjodhe "në shkollë" në pyetjen 31? **Ju lutem bëni vetëm një zgjedhje.**
☐ Po (shko tek pyetja 33)
☐ Jo (shko tek pyetja 35, mos i'u përgjigjni pyetjes 33 dhe 34)

33. Unë kam dëgjuar se "Pse janë të dëmshme bateritë për mjedisin?" në
(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐orët e mësimit të Kimisë
☐orët e mësimit të Historisë
☐orët e mësimit të Fizikës
☐orët e mësimit të Biologjisë
☐orët e mësimit të Gjeografisë
☐ Jo në mësime por në një aktivitet në shkollë
☐orët e mësimeve të tjera (Ju lutem shkruajeni në ……………………………………………)

34. Në ç'mënyre keni mësuar rreth "Pse janë të dëmshme bateritë për mjedisin" në këtë mësim?
(Ju mund të zgjidhni një ose me më shumë se një alternativa)
☐ Unë kam lexuar tekstin e librit mësimi
☐ Mësuesi na e kanë shpjeguar
☐ Mësuesi na ka dhënë material për të lexuar dhe për të dëgjuar
☐ Mësuesi im më ka dhënë për të bërë një projekt
☐ Mësuesi ka bërë eksperimente
☐ Mësuesi na ka treguar ne video/programe televizive/slajde për këtë çështje
☐ Mësuesi ka organizuar aktivitete jashtë klasës
☐ Të tjera. Ju lutem shkruajeni çfarë ………………………………………………………………….

35. Cili nga veprimet e mëposhtme mendoni se mund të pakësojë dëmtimin e mjedisit nga bateritë?
(Mund të zgjidhni një ose më shumë se një alternativë)
☐ Përdorimi i baterive të rikarikueshme
☐ T'i hedhësh bateritë në zjarr
☐ Të përdorësh bateri zhive
☐ Të riciklosh bateritë të parikarikueshme

36. Programe për mjedisin që janë zhvilluar në shkollën tuaj jane:
(Mund të zgjidhni një ose më shumë se një alternativë)
☐biseda me ekspertë për mjedisin
☐seminare
☐diskutime
☐konkurse kuiz

☐konkurse esesh
☐eksperimente
☐projekte shkencore
☐tjetër, specifikoje…………………………………………………………
☐asgjë nuk është organizuar

37. A keni marrë pjesë tek ndonjë

e) udhëtim mjedisor? ☐po ☐jo
f) kampe në natyrë? ☐po ☐jo
g) programe pastrimi? ☐po ☐jo
h) aktivitete të tjera jashtë ☐po ☐jo

klase nëse po ju lutem specifikojeni………………………………………………………………………………..

38. Kush mendoni se duhet të ketë përgjegjësinë kryesore për problemeve mjedisore ose ndalimin e përkeqësimit të problemeve?

(Ju lutem bëni një zgjedhje)

☐organizatat ndërkombëtarë (UN)
☐qeveria
☐qeverisja lokale
☐bizneset dhe industritë
☐organizatat për mbrojtjen e mjedisit
☐çdo individ
☐tjetër

Appendix F: Class 9 Environmental Knowledge and Awareness Questionnaire (C8EKAQ) - English

CLASS 9 ENVIRONMENTAL KNOWLEDGE AND AWARENESS QUESTIONNAIRE

Dear Student,

This questionnaire is for class 9 students. Below is the list of questions, to know your environmental knowledge and awareness level and what extent are chemistry subject effective on yours environmental knowledge and awareness.

This questionnaire is part of a doctoral thesis. I request you to read the questionnaire carefully and answer it. I wish to remind you that the successful completion of my research work depends entirely on your sincere co-operation.

The questionnaire is completely anonymous with no identifying information unless you choose to provide it. I assure you that the information that you give will be kept strictly confidential and will be used only for the research work. If you have questions regarding this study, you may contact Nihat Aksu, at e-mail:nihataksu@gmail.com.

Yours faithfully,

Nihat Aksu

Part A: These questions are about you, please mark the appropriate choice. <u>Do not write your name</u>.

1. I am a ☐ boy ☐ girl.
2. I am …………… years old.

Part B: The questions given below are based on some environmental issues. <u>Please answer the questions that only you know</u>. Feel free this is not an exam and your paper will not be marked. Your answers will be held in strict confidentiality and will be used only for the purposes of doctoral thesis study.

3. Have you ever heard about <u>acid rain</u> or not? **Please mark one choice**
   ☐ Yes (go to question 4)
   ☐ No (go to question 13, don’t answer questions 4,5,6,7,8,9,10,11 and 12)

4. What do you think acid rain is? **Please mark one choice**
   Acid rain is
   ☐the combination of the pollutants with water, which gives rain with acids (pH less than 5.6).
   ☐the contaminated rain which contains dirty gases and harmful substances.
   ☐the rain which contains mud.
   ☐Other
   ☐I don’t know

5. How do you think acid rain produced? **Please mark one choice**
   Acid rain is produced

☐from air pollutants which are combined with the water existing in the atmosphere and produce acids.
☐from the car exhausted fumes which are combined with the rain.
☐from the war bombs.
☐Other
☐I don't know

6. What are the consequences of acid rain to human beings and environment? **Please mark one choice**
☐The monuments are eaten into, little by little, the leaves of the trees are turning yellow and fall on the ground or that the lakes are made acidic
☐The environment is being contaminated and the microbes causes people's death
☐The acid rain is disastrous for the human beings since it causes several diseases
☐ Other
☐ I don't know

7. Do you think that the acid rain appears in the city, in the village or in both of them? **Please mark one choice**
☐City
☐Village
☐City and village

8. How important is the issue of acid rain to you personally? **Please mark one choice**
☐ Very important
☐Quite important
☐Not very important
☐Not at all important

9. How have you learned what is "acid rain"? **You may mark one or more than one choice**
Television/Radio☐ Friends/Family☐
Taught at school ☐ Internet☐
Newspapers☐ Conferences/Seminars☐
Magazines/Journals☐ Social Media(Facebook, Twitter,Instagram etc.)☐
Books☐ Environmental Groups☐
Other☐ (Please write in ……………………………….)

10. Did you mark "taught at school" in question 9? **Please mark one choice**
☐ Yes (go to question 11)
☐ No (go to question 13, don't answer questions 11 and 12)

11. I have heard about acid rain in the
(You may mark one or more than one choice)
Chemistry Lesson ☐ History Lesson ☐ ☐Not in a lesson but in a school activity
Physics Lesson ☐ Biology Lesson☐
Geography Lesson☐ Other Lesson☐ (please write in …………………..)

12. How have you learned <u>acid rain</u> in this lesson? **You may mark one or more than one choice**

☐ I have read in the textbook.
☐ Our teacher has explained in the class.
☐Our teacher has given reading and learning materials about acid rain.
☐ I have done a project about acid rain.
☐ We have done an experiment about acid rain.
☐ Our teacher has showed us a video/TV program/Slide about acid rain.
☐ Our teacher has organized seminar/ talk by experts.
☐ Our teacher has organized fieldwork/ trip/outdoor activity to teach acid rain.
☐ Other. Please write in …………………………………………………………………..

13. Have you heard of the “ozone layer”? **Please mark one choice**
☐ Yes (go to question 14)
☐ No (go to question 22, don’t answer questions 14,15,16,17,18,19,20 and 21)

14. What do you think the ozone layer does? **Please mark one choice**
☐Ozone layer protects the world from toxic gases
☐Ozone layer protects the world from harmful ultraviolet rays
☐Ozone layer protects the world from meteoroids
☐Other
☐I don’t know

15. The most effective gas which causes ozone layer destruction is
Please mark one choice
☐carbon dioxide (CO_2)
☐chlorofluorocarbon (CFC)
☐nitrogen (N_2)
☐other
☐I don’t know

16. If the ozone layer problem becomes worse,
Please mark one choice
☐there will be more water pollution
☐there will be more air pollution for us to breathe
☐more people will get skin cancer
☐other
☐I don’t know

17. How important is the issue of ozone depletion to you personally? **Please mark one choice**
☐ Very important
☐Quite important
☐Not very important
☐Not at all important

18. Where have you heard about Ozone Depletion? **You may mark one or more than one choice**

Television/Radio☐	Friends/Family☐
Taught at school ☐	Internet☐
Newspapers☐	Conferences/Seminars☐
Magazines/Journals☐	Social Media(Facebook, Twitter,Instagram etc.)☐

Books☐ Environmental Groups☐
Other☐ (Please write in ……………………………….)

19. Did you mark “taught at school” in question 18? **Please mark one choice**
☐ Yes (go to question 20)
☐ No (go to question 22, don’t answer questions 20 and 21)

20. I have heard about Ozone Depletion in the
(You may mark one or more than one choice)
Chemistry Lesson ☐ History Lesson ☐ ☐ Not in a lesson but in a school activity
Physics Lesson ☐ Biology Lesson☐
Geography Lesson☐ Other lesson☐ (please write in ……………………)

21. How have you heard about Ozone Depletion in this lesson? **You may mark one or more than one choice**
☐ I have read in the textbook.
☐ Our teacher has talked about Ozone Depletion.
☐ Our teacher has given reading and learning materials about Ozone Depletion.
☐ My teacher has given me a project about Ozone Depletion.
☐ Our teacher has done an experiment about Ozone Depletion.
☐ Our teacher has showed us a video/TV program/Slide about Ozone Depletion.
☐ Our teacher has organized seminar/ talk by experts.
☐ Our teacher has organized fieldwork/ trip/outdoor activity to teach Ozone Depletion.
☐ Other. Please write …………………………………………………………………..

22. Have you heard about “Greenhouse effect”? **Please mark one choice**
☐ Yes (go to question 23)
☐ No (go to question 30, don’t answer questions 23,24,25,26,27,28 and 29)

23. *Scientists say that the climate is slowly changing and that this is caused by ‘the greenhouse effect’. It is known that some gases in the atmosphere are responsible for the ‘greenhouse effect’. They are called ‘greenhouse gases’.*
Which of the following do you think is the main ‘greenhouse gas’? **Please mark one choice**
☐oxygen
☐carbon dioxide
☐nitrogen
☐chlorine
☐I don’t know

24. It is known that human activity produces greenhouse gases. Will the following activities tend to increase or decrease the amount of these gases in the atmosphere? **Please mark one choice in each row**

	Increase	**decrease**	**don’t know**
a) Burning oil or coal for fuel	☐	☐	☐
b) Planting trees and forests	☐	☐	☐
c) Making and using CFCs	☐	☐	☐
d) Using alternative energy sources such as			

e)	solar power and wind	☐	☐	☐
f)	Using motor cars	☐	☐	☐

25. How important is the issue of greenhouse effect to you personally? **Please mark one choice**
☐ Very important
☐Quite important
☐Not very important
☐Not at all important

26. How have you learned what is "greenhouse effect"? **You may mark one or more than one choice**
Television/Radio☐ Friends/Family☐
Taught at school ☐ Internet☐
Newspapers☐ Conferences/Seminars☐
Magazines/Journals☐ Social Media(Facebook, Twitter,Instagram etc.)☐
Books☐ Environmental Groups☐
Other☐ (Please write in ……………………………….)

27. Did you mark "taught at school" in question 26? **Please mark one choice**
☐ Yes (go to question 28)
☐ No (go to question 30, don't answer questions 28 and 29)

28. I have heard about greenhouse effect in the
(You may mark one or more than one choice)
Chemistry Lesson ☐ History Lesson ☐ ☐ Not in a lesson but in a school activity
Physics Lesson ☐ Biology Lesson☐
Geography Lesson☐ Other lesson ☐ (please write in ……………………)

29. How have you heard about greenhouse effect in this lesson? **You may mark one or more than one choice**
☐ I have read in the textbook.
☐ Our teacher has talked about greenhouse effect.
☐ Our teacher has given reading and learning materials about greenhouse effect.
☐ My teacher has given me a project about greenhouse effect.
☐ We have done an experiment about greenhouse effect.
☐ Our teacher has showed us a video/TV program/Slide about greenhouse effect.
☐ Our teacher has organized seminar/ talk by experts.
☐ Our teacher has organized fieldwork/ trip/outdoor activity to teach greenhouse effect.
☐ Other. Please write ………………………………………………………………..

30. Have you heard about environmental problems caused by <u>batteries</u>?
☐Yes (go to question 31)
☐No (go to question 36,don't answer questions 31,32,33,34 and 35)

31. How have you be informed about harmful effects of batteries to the environment?
(You may mark one or more than one choice)
Television/Radio☐ Friends/Family☐

Taught at school ☐ Internet☐
Newspapers☐ Conferences/Seminars☐
Magazines/Journals☐ Social Media(Facebook, Twitter,Instagram etc.)☐
Books☐ Environmental Groups☐
Other☐ (Please write in ……………………………….)

32. Did you mark "taught at school" in question 31? **Please mark one choice**
☐ Yes (go to question 33)
☐ No (go to question 35, don't answer questions 33 and 34)

33. I have heard about "Why are batteries harmful to the environment?" in the
(You may mark one or more than one choice)
Chemistry Lesson ☐ History Lesson ☐ ☐ Not in a lesson but in a school activity
Physics Lesson ☐ Biology Lesson☐
Geography Lesson☐ Other lesson☐ (please write in …………………..)

34. How have you learned 'why are batteries harmful to the environment?' in this lesson?
(You may mark one or more than one choice)
☐ I have read in the textbook.
☐ Our teacher has explained.
☐ Our teacher has given reading and learning materials.
☐ My teacher has given me a project.
☐ Our teacher has done an experiment.
☐ Our teacher has showed us a video/TV program/Slide.
☐ Our teacher has organized an outdoor activity program.
☐ Other. Please write …………………………………………………………………..

35. Which one(s) of the following actions do you think may reduce environmental damages of batteries
(You may mark one or more than one choice)
☐Use rechargeable batteries
☐Dispose of a battery in a fire
☐Use mercury batteries
☐Recycle your non-rechargeable batteries

36. Environmental programs organized in the school are
(You may mark one or more than one choice)
☐Talk by experts
☐Seminar
☐Discussion
☐Quiz competition
☐Essay competition
☐Experiments
☐Science projects
☐Other, specify…………………………………………..
☐Nothing organized

37. Have you participated any
e) environmental trip? ☐yes ☐no

f) nature camps? ☐yes ☐no

g) cleaning program? ☐yes ☐no

h) other outdoor activities? ☐yes ☐no

(If answer of d is yes please specify………)

38. Who do you think should have the main responsibility for tackling environmental problems?
Please mark one choice
☐International organizations (e.g. the UN)
☐The national government
☐Local government
☐Business and industry
☐Environmental organizations
☐Individuals
☐Other

Appendix G: Teachers' Environmental Knowledge and Instructional Skills Questionnaire (TEKAISQ) - Albanian

Pyetësor Për Mësuesit Mbi Aftësitë Mësimdhënëse Dhe Njohuritë Mjedisore

I dashur Mësues,

Ky pyetësor është për mësueset / mësuesit e Kimisë. Qëllimi i tij është të marrim disa mendime dhe ide se deri ne ç'masë ndikojnë tek nxënësit e klasës së 8 dhe 9 njohuritë e lëndës së Kimisë dhe informacioni I vetë mësuesve që shpjegonjnë këtë lëndë për njohuritë mjedisore dhe ndërgjegjësimin e nxënësve në lidhje me mjedisin.

Ky pyetësor është pjesë e një teze doktorature.Ju kërkoj ta lexoni këtë pyetësor me kujdes dhe t'i përgjigjeni atij. Dëshiroj t'ju kujtoj se realizimi me sukses i punës sime kërkimore varet nga bashkëpunimi juaj i sinqertë.

Pyetësori është plotësisht anonim, pa informacion indentifikues, përveç rastit kur ju mund të mos mbeteni anonim.Ju siguroj që informacioni qe jepni do të mbetet konfidencial në mënyrë strikte dhe do të përdoret vetëm për kërkim. Nëse keni pyetje në lidhje me këtë studim, ju mund të kontaktoni Nihat Aksu, në adresën e e-mail: nihataksu@gmail.com

Me respekt

Nihat Aksu

Emri i shkollës:... **(është opsion, mund ta shkruajmë ose jo)**

1. Gjinia ☐ Mashkull ☐ Femër
2. Sa vite pune eksperiencë keni?
   ☐ 0-5 ☐ 6- 10 ☐ 11-20 ☐ mbi 20
3. Në cilat klasa jepni mësim lëndën e kimisë? **(Mund të zgjidhni më shumë se një)**
   ☐ klasa e 8 ☐ klasa e 9 ☐ klasa e 8 dhe klasa e 9
4. Gjatë mësimdhënies së kimisë në klasë, sa shpesh i përdorni strategjitë e mëposhtme të mësimdhënies?

	Në çdo mësim ose Po thuajse çdo mësim	**Rreth 50% të mësimeve/orëve**	**Në disa mësime**	**Asnjëherë**
a) Udhëtime/aktivitete në terren	☐	☐	☐	☐
b) Leksione	☐	☐	☐	☐
c) Eksperimentet	☐	☐	☐	☐
d) Projekte në grup ose të pavarura	☐	☐	☐	☐
e) Aktivitetet e të mësuarit nëpërmjet kompjuterit	☐	☐	☐	☐
f) Aktrimi në role	☐	☐	☐	☐
g) Lojëra/ Konkurse	☐	☐	☐	☐

h)	Video/Programe TV/ slajde	☐	☐	☐	☐
i)	Diskutim	☐	☐	☐	☐
j)	Zgjidhje problemash/ mendim kritik	☐	☐	☐	☐

5. Sa të rëndësishme janë problemet lidhur me mjedisin për ju personalisht?
   ☐ Jo dhe aq të rëndësishme (shko tek pyetja 8)
   ☐ Jo shumë të rëndësishme (shko tek pyetja 8)
   ☐ Mjaftueshëm të rëndësishme (shko tek pyetja 6)
   ☐ Shumë të rëndësishme (shko tek pyetja 6)

6. Një nga qëllimet e mia në mësimdhënien e kimisë është rritja e nivelit te përgjegjësisë së nxënësve në lidhje me mjedisin.
   ☐ Nuk jam aspak dakord ☐ Nuk jam dakord ☐ Asnjanës
   ☐ Jam Dakord ☐ Jam Shumë dakord

7. Nga e merrni infomacionin rreth koncepteve dhe problemeve mjedisore? **(Mund të zgjidhni më shumë se një)**
   ☐ TV/Radio ☐ Revista/ Libra
   ☐ Gazeta ☐ Shokët/Familja
   ☐ Interneti ☐ Agjensitë e qeverisë
   ☐ Organizata vullnetare ☐ Agjensitë jo qeveritare
   ☐Shkolla/Universiteti
   ☐ Të tjera, ju lutemi shkruani
   çfarë……………………………………………………………………………………

8. Si do ta përshkruanit nivelin e dijeve tuaja mbi mësimdhënien e edukimit mjedisor?
   ☐ Shumë i pakënaqur ☐ I pakënaqur ☐ I pasigurt ☐ I kënaqur ☐ Shumë i kënaqur

9. A mendoni se temat e kimisë së klasave të 8-ta dhe të 9-ta janë të dobishme për ndërgjegjësimin e problemeve të mëposhtme mjedisore? **(Mund të zgjidhni më shumë se një)**
   ☐ Ndotja e ujit ☐ Ndotja e ajrit
   ☐ Ngrohja globale ☐ Ndotja akustike
   ☐ Efekti serë ☐ Riciklimi
   ☐ Ndotja e tokës ☐ Dëmtimi I shtresës së ozonit
   ☐ Shiu acid ☐ Shpyllëzimi
   ☐ Ndotja kimike ☐ Bipopullsia
   ☐ Asnjëra ☐ Humbja e biodiversitetit

10. A mendoni se përmbajtjet e kurrikulave të kimisë të klasave të 8-ta dhe klasave të 9-ta janë efektive për të nxitur ndërgjegjësimin e nxënësit në lidhje me konceptet dhe problemet mjedisore?

☐ E paefektshme ☐ Jo dhe aq efektive ☐ I pasigurt ☐ Disi efektive
☐ Shumë efektive

11. A mendoni se tekstet shkollore të klasave të 8-ta dhe 9-ta kanë përmbajtje të kënaqshme në lidhje me konceptet dhe problemet e mjedisit të cilat gjenden në kurrikulat e kimisë?
☐ Shume i/e pakënaqur ☐ I/e pakënaqur ☐ I/e pasigurtë ☐ I/e kënaqur ☐ Shume i/e kënaqur

12. Kur i mësoni kiminë nxënësve të **<u>klasës së 8-të</u>**, a i mësoni atyre për ndonjë problem në lidhje më mjedisin?
☐ Po (shko tek pyetja 13)
☐ Jo (shko tek pyetja 17)

13. Cilat prej problemeve të mjedisit u mësoni?
……
……
……
……
………..

14. Çfarë i mësoni në lidhje me keto probleme?
……
……
……
……
……
……
……
……
……
…………………………………………………………………………………..
……
…………………………………………….

15. Si ia mësoni këto probleme të mjedisit?
……
……
……
……
……
……
……
……

16. Çfare aktivitetesh zhvillojnë nxënësit në shkollë / në shtëpi në lidhje me këto probleme?
....
....
....
....
....
....
....
....
....
17. Kur i mësoni kiminë nxënësve të **<u>klasës së 9-të</u>**, a i mësoni atyre ndonjë problem në lidhje me mjedisin?
☐ Po (shko tek pyetja 18)
☐ Jo (shko tek pyetja 22)
18. Cilat prej problemeve të mjedisit u mësoni?
....
....
....
....
....
19. Çfarë i mësoni në lidhje me këto probleme?
....
....
....
....
....
....
....
....
....
....
20. Si ia mësoni këto probleme të mjedisit?
....
....
....
....
....
....
....
....
....
....

21. Çfare aktivitetesh zhvillojnë nxënësit në shkollë / në shtëpi në lidhje me këto probleme?
....
....
....
....
....

22. Tregoni disa prej problemeve kryesore që keni hasur me klasën tuaj gjatë mësimdhënies së problemeve të mjedisit.

		Aspak dakord	**Jo dakord**	**Asnjanës**	**Dakord**	**Shumë dakord**
a)	Mungesa e kohës në orën e mësimit	☐	☐	☐	☐	☐
b)	Mungesa e kohës së pregatitjes	☐	☐	☐	☐	☐
c)	Mungesa e mjeteve mësimore	☐	☐	☐	☐	☐
d)	Mungesa e fondeve	☐	☐	☐	☐	☐
e)	Mungesa e mbështetjes nga administratorët e shkollës	☐	☐	☐	☐	☐
f)	Mungesa e njohurive rreth problemeve të mjedisit	☐	☐	☐	☐	☐
g)	Klasës është shumë e madhe	☐	☐	☐	☐	☐
h)	Problemet e mjedisit nuk janë të Përshtatshme me atë ç'ka i mësoj unë.	☐	☐	☐	☐	☐

23. A keni marrë pjesë në trajnime për edukimin mbi mjedisin brenda 5 viteve të fundit?
☐ Po ☐ Jo (shko tek pyetja 25)
Llojet e trajnimeve
....
....
....

24. Nësë përgjigjja e pyetjes 23 është po, në përgjithësi, a të ndihmoi tajnimi?
☐Aspak ☐Jo shumë ☐Mjaft ☐Shumë

25. A e keni përdorur më parë, ose a e përdorni "Paketën e Gjelbër"?
☐ Po ☐ Jo
Nëse përgjigjja juaj është po, ju lutem shkruani komentin tuaj
....
....
....
....
....
....

26. Çfarë mund të bëhet për të përmirësuar ndërgjegjësimin i nxënësve për mjedisin gjatë

mësimidhënies së kimisë.

(Mund të zgjidhni më shumë se një)

☐ Sigurimi i materialeve suplementar/ndihmuese
☐ Përmirësimi i kurrikulës
☐ Trajnimi mësuesve
☐ Përmirësimi i teksteve
☐ Bashkëpunimi me komunitetin local
☐ Udhëtime në terren
☐ Konferenca/Seminare
☐ Ftimi i ekspertëve në klasë
☐ Eksperimente/ Projekte
☐ Mësimdhënia me në qendër mësuesin
☐ Mësimdhënia me në qendër nxënësin aktiv
☐ Bashkëpunimi me NGO-të

Appendix H: Teachers' Environmental Knowledge and Instructional Skills Questionnaire (TEKAISQ) – English

TEACHERS' ENVIRONMENTAL KNOWLEDGE AND INSTRUCTIONAL SKILLS QUESTIONNAIRE

Dear Teacher,

This questionnaire is for chemistry teachers. The purpose is to seek some feedback and ideas on what extent are chemistry subject and teachers' content knowledge and attitude effective on environmental knowledge and awareness of grade 8 and 9 students while teaching chemistry.

This questionnaire is part of a doctoral thesis. I request you to read the questionnaire carefully and answer it. I wish to remind you that the successful completion of my research work depends entirely on your sincere co-operation.

The questionnaire is completely anonymous with no identifying information unless you choose to provide it. I assure you that the information that you give will be kept strictly confidential and will be used only for the research work. If you have questions regarding this study, you may contact Nihat Aksu, at e-mail:nihataksu@gmail.com.

Yours faithfully,

Nihat Aksu

School Name :………………………………………………***(optional, you may leave blank)***

1. Gender ☐ Male ☐ Female

2. How many years of work experience do you have?

☐ 0-5 ☐ 6-10 ☐ 11-20 ☐over 20

3. Which classes do you teach chemistry? (You may tick more than one)

☐ class 8 ☐ class 9 ☐ class 8 and class 9

4. In teaching chemistry to the students, how often do you use following teaching/learning strategies?

		Every or almost every lesso	About half the lessons	Some lessons	Never
a)	Field trips/ outdoor activities	☐	☐	☐	☐
b)	Lectures	☐	☐	☐	☐
c)	Experiments	☐	☐	☐	☐
d)	Independent or group projects	☐	☐	☐	☐
e)	Computer-assisted learning activities	☐	☐	☐	☐
f)	Role-playing	☐	☐	☐	☐
g)	Games/competitions	☐	☐	☐	☐
h)	Video/TV programmes/Slides	☐	☐	☐	☐
i)	Discussion	☐	☐	☐	☐
j)	Problem solving/critical thinking	☐	☐	☐	☐

5. How important is environmental issues to you personally?

☐ Not at all important (go to question 8) ☐ Quite important (go to question 6)

☐ Not very important (go to question 8) ☐ Very important (go to question 6)

6. One of my teaching goals of chemistry is the increase students' level of environmental

responsibility.
☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

7. How do you get information about environmental concepts and issues? (You can tick more than one option)
☐TV/Radio ☐Newspapers ☐Internet ☐Magazines/Books
☐Friends/Family ☐Voluntary organizations ☐School/University ☐Government agencies
☐Non-Governmental agencies ☐Other (please write in ……………………………………….)

8. How will you describe your content knowledge level about teaching environmental education?
☐ Very dissatisfied ☐ Dissatisfied ☐ Unsure ☐ Satisfied ☐ Very satisfied

9. Do you think class 8 and class 9 chemistry topics are helpful for the following environmental issues? (You can tick more than one option)
☐ Water pollution ☐ Global warming ☐ Greenhouse effect ☐ Air pollution
☐ Noise pollution ☐ Soil pollution ☐ Ozone layer depletion ☐ Acid rain
☐ Recycling ☐ Chemical pollution ☐ Loss of biodiversity ☐ Deforestation
☐ Population ☐ None

10. Do you think class 8 and class 9 chemistry curricula contents are effective for encouraging students' awareness of environmental concepts and problems?
☐ Ineffective ☐ Not very effective ☐ Not sure ☐ somewhat effective ☐ Very effective

11. Do you think class 8 and class 9 textbooks have satisfied content related to the environmental concepts and problems which were indicated in the chemistry curricula?
☐ Very dissatisfied ☐ Dissatisfied ☐ Unsure ☐ Satisfied ☐ Very satisfied

12. In teaching chemistry to the **class 8 students**, do you teach any environmental issues?
☐Yes (go to question 13)
☐No (go to question 17)

13. Which environmental issues do you teach?
………
………
……………………………………………………………………………………………

14. What do you teach concerning these environmental issues?
………
………
………
………
………
………
………
……

15. How do you teach these environmental issues?
………
………
………
………

………
………
………
………
………
………
………
…….

16. Which activities do the students conduct at school/ at home relating to these issues?
………
………
………
………
………
………
………
………

17. In teaching chemistry to the **<u>class 9 students</u>**, do you teach any environmental issues?
☐Yes (go to question 18)
☐No (go to question 22)

18. Which environmental issues do you teach?
………
………
…………………………………………………………………………………………………

19. What do you teach concerning these environmental issues?
………
………
………
………
………
………
………
………
………
……………………………………………

20. How do you teach these environmental issues?
………
………
………
………
………
………
………
………
………

21. Which activities do the students conduct at school/ at home relating to these issues?
………

………
………
………
………
………
………

22. Indicate some of the main problems encountered in teaching environmental issues with your class?

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
a) Lack of class time	☐	☐	☐	☐	☐
b) Lack of preparation time	☐	☐	☐	☐	☐
c) Lack of instructional materials	☐	☐	☐	☐	☐
d) Lack of funding	☐	☐	☐	☐	☐
e) Lack of school administration support	☐	☐	☐	☐	☐
f) Lack of knowledge about environmental issues	☐	☐	☐	☐	☐
g) Class size too large	☐	☐	☐	☐	☐
h) Environmental issues is not relevant to what I teach	☐	☐	☐	☐	☐

23. Have you participated in in-service training in environmental education within the last 5 years?
Yes☐ No☐ (go to question 25)
Sort of in-service training
………
………
……………………………………………………………………………………………

24. If the answer to question 23 is yes, in general, was the training helpful?
☐Not at all helpful ☐ Not very helpful ☐ Fairly helpful ☐ Very helpful

25. Have you used before or do you use Green Pack kit?
☐Yes ☐No
If your answer is yes, please write in your comments………
………
………
………
………

26. What could be done to improve environmental awareness of students while teaching chemistry? (You can tick more than one)
☐Providing supplementary materials/kits ☐Development of curriculum ☐Training the teachers
☐Improvement of textbook ☐Cooperation with local community ☐Field trips
☐Conferences/seminars ☐Inviting experts in the classroom
☐Experiments/Projects ☐Teacher-centered teaching
☐Active student-centered teaching ☐Cooperation with NGOs

Appendix I: Questionnaire Items Evaluators (Teachers) List

Chemistry-Biology Teacher: Afrim Sezai (Shkolla H.Mahmud Dashi)

Physics Teacher: Ibrahim Nako (Shkolla H.Mahmud Dashi)

Geography Teacher: Myrvete Kali (Shkolla H.Mahmud Dashi)

Albanian Language Teacher: Esat Bunguri (Shkolla H.Mahmud Dashi)

Appendix J: External Validity Expert Review Panel

Name Surname	The workplace/ Organization and Position	Designation	Discipline
Bekim Trezhnjeva	Specialist	Environmental specialist	Environmental biology
Genci Kadilli	ASPBM[a]	Environmental biolog	Environmental biology
Blerina Bajrami	DSHP[b]	Lecturer	Environmental biology
Olsi Nika	Eko Albania	Environmental expert (lecturer)	Environmental biology
Ina Nasto	Universiteti Vlore	lecturer	biology
Marinela Mitno	AKZM[c]	Environmentalists	Environmental biology
Olsion Lama	ASPBM	Biotechnologist	Biotechnology
Eva Dulellari	ASPBM	Environmental biolog	Environmental biology Environmental biology
Mihallaq Qirjo	REC[d]	Country Office Director	Ecologist
Ylli Muçogllava	Shkolla Drita e dijes	Teacher	Biology-chemistry
Myrvete Kali	Shkolla H.Mahmud Dashi	Deputy Headmaster	Geography

a. Albanian Society for Protection of Birds & Mammals
b. Department of public health
c. National Agency of Protected Areas
d. The Regional Environmental Center Albania

Appendix K: Class 8 External Validity Panel Questionnaire – Albanian

VLEFSHMËRIA E VLERËSIMIT TË JASHTËM MBI PYETËSORIN E NXËNËSVE TË KLASËS SË 8

Klasa 8

(1)Emer dhe Mbiemer
………………………………………………………………………………………
(2) Vendi i punes/Organizata dhe Pozicioni…………………………………………
(3)Emertim/titull……………………………………………………………………..
(4) Disiplina/ dega…………………………………………………………………

Pjesa II
Pikpamja/veshtirimi i pergjithshem i vleresuesit rreth pyetesorit te klases se 8 mbi njohuritë mjedisore dhe ndërgjegjësimin

(5) A mendoni se ka diskriminim gjinor ose paragjykim ne pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………….

6 A mendoni se ka diskriminim etnik/kulturor ose paragjykim ne kete pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………….

7 A mendoni se ka diskriminim social/krahinor ose paragjykim ne kete pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………….

8 A mendoni se pyetjet/pikate studimit jane pershkruar qarte dhe jane te kuptueshme lehtesisht?
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
…………….

9 A mendoni se pyetesori mund te aplikohet ne nje periudhe (15-25min) dhe te perfitohen rezultate te frytshme?
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
…………….

Pjesa III
Vlefshmeria e pikave te pyetesorit.Ju lutem jepni opinionin tuaj rreth pikave te pyetesorit.
10) Pyetjet 1 dhe 2 jane pyetje demografike.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
…………….

11) Pikat 3, 13 dhe 22 jane te vlefshme per te matur nese nxenesit e klases se 8 kane ndonje informacion rreth shiut acid, shtreses se ozonit dhe efektin sere respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………………………
…………….

12) Pyetjet 4-7, 14-16, dhe 23&24 jane pyetje te vlefshme per te matur permbajtjen themelore te dijeve tek nxenesit e klases se 8 rreth shiut acid, shtreses se ozonit dhe

efektin sere respektivisht.

Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………….

13) Pikat 8,17 dhe 25 jane te vlefshme per te matur nivelin e ndergjegjesimit te klases se 8 mbi ceshtjet e shiut acid, shtreses se ozonit dhe efektit sere respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………

14) Pikat 9, 18 dhe 26 jane te vlefshme per te zbuluar/gjetur burime informacioni mbi shiun acid, shtresen e ozonit dhe efektin sere perkatesisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………

15) Pikat 10, 19 dhe 27 jane te vlefshme per te konfirmuar ndikimin e shkolles si nje burim informacioni rreth shiut acid, shtreses se ozonit dhe efektin sere respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………

16) Pikat 11,20 dhe 28 jane te vlefshme per te matur efektshmerine e lendes tek ndergjegjesimi i nxenesve rreth shiut acid, shtreses se ozonit dhe efektin sere respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………
…………………………………………………………………………………

17) Pikat 12, 21 dhe 29 jane te vlefshme per te vleresuar cilat metoda shpjegimi/mesimi jane perdorur gjate mesimit per te mesuar rreth shiut acid, shtreses se ozonit dhe efektin sere respektivisht.

Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
…………….

18) Pikat 30 dhe 31 jane te vlefshme per te matur efektin e aktiviteteve jashte-kurrikulare dhe jashteshkollore ne njohuritë mjedisore dhe ndërgjegjësimin te nxenesve te klases se 8.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
…………….

19) Pika 32 eshte e vlefshme per te matur nivelin e ndergjegjesimit mjedisor tek nxenesit e klases se 8.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
…………………….

Appendix L: Class 8 External Validity Panel Questionnaire – English

CLASS 8 EAQ EXTERNAL VALIDITY PANEL EVALUATION QUESTIONNAIRE

Part I

The evaluator's profile;

(1) Name and Surname:
………………………………………………………………………..

(2) The workplace/ Organization and Position:
………………………………………………………………………………
……………………………………………………………………………

(3) Designation:
…………………………………………………………………………….

(4) Discipline:
……………………………………………………………………………

Part II

The general views of evaluator about Class 8 Environmental Knowledge and Awareness Questionnaire;

(5) Do you think there is ***gender discrimination*** or ***bias*** in the questionnaire?
Yes ( ) No ( )
If you think that there is, please explain its reason
………………………………………………………………………………
………………………………………………………………………………
……………………

(6) Do you think there is ***ethnic/ cultural discrimination*** or ***bias*** in the questionnaire?
Yes ( ) No ( )
If you think that there is, please explain its reason
………………………………………………………………………………
………………………………………………………………………………
……………………

(7) Do you think there is ***social/ regional discrimination*** or ***bias*** in the questionnaire?
Yes ( ) No ( )
If you think that there is, please explain its reason
………………………………………………………………………………
………………………………………………………………………………
……………………

(8) Do you think the survey questions/items are clearly described and easily

understandable?
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………………
……………………………………………………………………………………
……………………
(9) Do you think the questionnaire can be applied in one session (15 -25 minutes) and efficient results can be obtained?
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………………
……………………………………………………………………………………
……………………

Part III.

Validity of Questionnaire Items;

Please give your opinion about questionnaire items.

(10) Questions 1 and 2 are demographic questions.
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………

(11) Items 3, 13, and 22 are valid to measure do class 8 students have any information about acid rain, ozone depletion, and greenhouse effect respectively.
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………

(12) Questions 4 – 7, 14 – 16, and 23 & 24 are valid questions to measure basic content knowledge of class 8 students about acid rain, ozone depletion, and greenhouse effect respectively.
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………………
……………………………………………………………………………………

(13) Items 8, 17, and 25 are valid to measure awareness level of class 8 students on acid rain, ozone depletion, and greenhouse effect issues respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………………

(14) Items 9, 18, and 26 are valid to detect sources of information about acid rain, ozone depletion, and greenhouse effect respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………

(15) Items 10, 19, and 27 are valid to confirm impact of school as a source of information about acid rain, ozone depletion, and greenhouse effect respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………………

(16) Items 11, 20, and 28 are valid to measure subject effectiveness on students' awareness about acid rain, ozone depletion, and greenhouse effect respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………………

(17) Items 12, 21, and 29 are valid to assess which teaching/learning methods were used during the lesson to learn about acid rain, ozone depletion, and greenhouse effect respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

…………………………………………………………………………………………
…………………………………………………………………………………………
………………………………………

(18) Items 30 and 31 are valid to measure effect of extra-curricular and outdoor activities on environmental knowledge and awareness of class 8 students.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
………………………………………

(19) Item 32 is valid to measure environmental awareness level of class 8 students.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
……………………

Appendix M: Class 9 External Validity Panel Questionnaire – Albanian

VLEFSHMËRIA E VLERËSIMIT TË JASHTËM MBI PYETËSORIN E NXËNËSVE TË KLASËS SË 9

Klasa 9

(1)Emer dhe Mbiemer
…………………………………………………………………………………………
(2) Vendi i punes/Organizata dhe Pozicioni……………………………………………
(3)Emertim/titull……………………………………………………………………..
(4) Disiplina/
dega………………………………………………………………………………

Pjesa II
Pikpamja/veshtirimi i pergjithshem i vleresuesit rreth pyetesorit te klases se 9 mbi njohuritë mjedisore dhe ndërgjegjësimin.

(5) A mendoni se ka diskriminim gjinor ose paragjykim ne pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj

……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
…………….

6 A mendoni se ka diskriminim etnik/kulturor ose paragjykim ne kete pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
…………….
7 A mendoni se ka diskriminim social/krahinor ose paragjykim ne kete pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
…………………………………………………………………………………………….
8 A mendoni se pyetjet/pikate studimit jane pershkruar qarte dhe jane te kuptueshme

lehtesisht?
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………….
9 A mendoni se pyetesori mund te aplikohet ne nje periudhe (15-25min) dhe te perfitohen rezultate te frytshme?
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………….

Pjesa III
Vlefshmeria e pikave te pyetesorit.Ju lutem jepni opinionin tuaj rreth pikave te pyetesorit.
10) Pyetjet 1 dhe 2 jane pyetje demografike.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………….

11) Pikat 3, 13, 22 dhe 30 jane te vlefshme per te matur nese nxenesit e klases se 9 kane ndonje informacion rreth shiut acid, shtreses se ozonit, efektin sere dhe problemet mjedisore te shkaktuara nga baterite respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
…………………………………………………………………………………………
…………………………………………………………………………………………
………………………………………………………………………………………….
12) Pyetjet 4-7, 14-16, 23&24 dhe 35 jane pyetje te vlefshme per te matur permbajtjen

themelore te dijeve tek nxenesit e klases se 8 rreth shiut acid, shtreses se ozonit, efektin sere dhe problemet mjedisore te shkaktuara nga baterite respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
…………….

13) Pikat 8,17 dhe 25 jane te vlefshme per te matur nivelin e ndergjegjesimit te klases se 9 mbi ceshtjet e shiut acid, shtreses se ozonit dhe efektit sere respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
…………….

14) Pikat 9, 18 26 dhe 31 jane te vlefshme per te zbuluar/gjetur burime informacioni mbi shiun acid, shtresen e ozonit, efektin sere dhe problemet mjedisore te shkaktuara nga baterite perkatesisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
……………………………………………………………………………………….

15) Pikat 10, 19, 27 dhe 32 jane te vlefshme per te konfirmuar ndikimin e shkolles si nje burim informacioni rreth shiut acid, shtreses se ozonit, efektin sere dhe problemet mjedisore te shkaktuara nga baterite respektivisht.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
……………………………………………………………………………………….

16) Pikat 11,20, 28 dhe 33 jane te vlefshme per te matur efektshmerine e lendes tek

ndergjegjesimi i nxenesve rreth shiut acid, shtreses se ozonit, efektin sere dhe problemet mjedisore te shkaktuara nga baterite respektivisht.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
……………

17) Pikat 12, 21, 29 dhe 34 jane te vlefshme per te vleresuar cilat metoda shpjegimi/mesimi jane perdorur gjate mesimit per te mesuar rreth shiut acid, shtreses se ozonit dhe efektin sere respektivisht.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
……………

18) Pikat 36 dhe 37 jane te vlefshme per te matur efektin e aktiviteteve jashte-kurrikulare dhe jashteshkollore ne njohuritë mjedisore dhe ndërgjegjësimin te nxenesve te klases se 9.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
……………

19) Pika 38 eshte e vlefshme per te matur nivelin e ndergjegjesimit mjedisor tek nxenesit e klases se 9.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………

Appendix N: Class 9 External Validity Panel Questionnaire – English

CLASS 9 EAQ EXTERNAL VALIDITY PANEL EVALUATION QUESTIONNAIRE

Part I

The evaluator's profile;

(1) Name and Surname:
……………………………………………………………………..

(2) The workplace/ Organization and Position:
………………………………………………………………………………………

(3) Designation:
……………………………………………………………………………….

(4) Discipline:
……………………………………………………………………………………

Part II

The general views of evaluator about Class 9 Environmental Knowledge and Awareness Questionnaire;

(5) Do you think there is ***gender discrimination*** or ***bias*** in the questionnaire?

Yes ( ) No ( )

If you think that there is, please explain its reason

……………………………………………………………………………
………………………………………………………………………………………
……………………………

(6) Do you think there is ***ethnic/ cultural discrimination*** or ***bias*** in the questionnaire?

Yes ( ) No ( )

If you think that there is, please explain its reason

……………………………………………………………………………
………………………………………………………………………………………
……………………………

(7) Do you think there is ***social/ regional discrimination*** or ***bias*** in the questionnaire?

Yes ( ) No ( )

If you think that there is, please explain its reason

……………………………………………………………………………
………………………………………………………………………………………
……………………………

(8) Do you think the survey questions/items are clearly described and easily understandable?

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………
………………………………………………………………………………………
……………………………

(9) Do you think the questionnaire can be applied in one session (15 -25 minutes) and efficient results can be obtained?

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………
……………………………………………………………………………………
……………………………

Part III.

Validity of Questionnaire Items;

Please give your opinion about questionnaire items.

(10) Questions 1 and 2 are demographic questions.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………

(11) Items 3, 13, 22, and 30 are valid to measure do class 9 students have any information about acid rain, ozone depletion, greenhouse effect, and environmental problems caused by batteries respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(12) Questions 4 – 7, 14 – 16, 23 & 24, and 35 are valid questions to measure basic content knowledge of class 9 students about acid rain, ozone depletion, greenhouse effect, and environmental problems caused by batteries respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(13) Items 8, 17, and 25 are valid to measure awareness level of class 9 students on acid rain, ozone depletion, and greenhouse effect issues respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(14) Items 9, 18, 26, and 31 are valid to detect sources of information about acid rain, ozone depletion, greenhouse effect, and environmental problems caused by batteries respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(15) Items 10, 19, 27, and 32 are valid to confirm impact of school as a source of information about acid rain, ozone depletion, greenhouse effect, and environmental problems caused by batteries respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(16) Items 11, 20, 28, and 33 are valid to measure subject effectiveness on students' awareness about acid rain, ozone depletion, greenhouse effect, and environmental problems caused by batteries respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(17) Items 12, 21, 29, and 34 are valid to assess which teaching/learning methods were used during the lesson to learn about acid rain, ozone depletion, greenhouse effect, and environmental problems caused by batteries respectively.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(18) Items 36 and 37 are valid to measure effect of extra-curricular and outdoor activities on environmental knowledge and awareness of class 9 students.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

(19) Item 38 is valid to measure environmental awareness level of class 9 students.

Yes ( ) No ( )

If your answer is No, please explain its reason

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………

Appendix O: Teachers External Validity Panel Questionnaire – Albanian

VLEFSHMËRIA E VLERËSIMIT TË JASHTËM MBI PYETËSORIN E MËSUESIT

Mesuesi
(1)Emer dhe Mbiemer……..
(2) Vendi i punes/Organizata dhe Pozicioni…………………………………………………………………….
(3)Emertim/titulli……….
(4) disiplina/ dega……

Pjesa II
Veshtrimi i pergjithshem i vleresuesit rreth dijes mjedisore te mesuesit dhe pyetesor i aftesive mesimore/udhezuese.

(5) A mendoni se ka diskriminim gjinor ose paragjykim ne pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj
………
………
………
……..

(6) A mendoni se ka diskriminim etnik/kulturor ose paragjykim ne kete pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj
………
………
………
……..

(7) A mendoni se ka diskriminim social/krahinor ose paragjykim ne kete pyetesor?
Po ( ) Jo ( )
Nese mendoni se po atehere shpjegoni arsyen tuaj
………
………
………
……..

(8) A mendoni se pyetjet/pikat e studimit jane pershkruar qarte dhe jane te kuptueshme lehtesisht?
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
………
………
……….

(9) A mendoni se pyetesori mund te aplikohet ne nje periudhe (25-30min) dhe te perfitohen rezultate te frytshme?

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

………
………
……….

Pjesa III

Vlefshmeria e pikave te pyetesorit. Ju lutem jepni opinionin tuaj rreth pikave te pyetesorit.

(10) Pyetjet 1,2 dhe 3 jane pyetje demografike.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

………
………
……….

(11) Pyetja 4 eshte e vlefshme per te vleresuar cilat metoda mesimdhenie/mesimnxenie jane perdorur gjate shpjegimit te kimise.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

………
………
……..

(12) Pyetjet 5,6 dhe 7 jane te vlefshme per te matur nivelin ndergjegjesimit mjedisor te mesuesve te kimise.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

………
………
……….

(13) Pyetjet 5,6 dhe 7 jane te vlefshme per te matur nivelin e dijes mbi permbajtjen mjedisore te mesuesve te kimise.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

………
………
……….

(14) Pyetja 10 eshte e vlefshme per te matur efektin e planit mesimor/kurrikules se kimise se klases se 8 dhe klases se 9 mbi nivelin e ndergjegjesimit te nxenesve.

Po ( ) Jo ( )

Nese mendoni se JO atehere shpjegoni arsyen tuaj

………
………
……….

(15) Pyetja 11 eshte e vlefshme per te matur ne cfare niveli/shtrirje tekstet shkollore te kimise se klases 8 dhe klases se 9 kane permbajtje lidhur me ceshtjet mjedisore.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
……
……
………..
(16) Pyetjet 12-16 dhe 17-21 jane te vlefshme per te matur ne cfare niveli/shtrirje mesuesi i kimise shpjegon ceshtjet mjedisore gjate ores se kimise respektivisht ne klasat e 8 dhe te 9 dhe jane te vlefshme per te vleresuar cilat ceshtje mjedisore, cfare, dhe si jane shpjeguar nga mesuesit e kimise gjate ores se kimise.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
……
……
………..
(17) Pyetja22 eshte e vlefshme per te matur pengesat qe kane hasur nga mesuesit gjate shpjegimit te ceshtjeve mjedisore per nxenesit.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
……
……
………..
(18) Pyetjet 23 dhe 24 jane te vlefshme per te matur efektin e trajnimit mbi edukimin tek permbajtja e njohurive dhe ndergjegjesimit mjedisor te mesuesve.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
……
……
………..
(19) Pika 25 eshte e vlefshme per te matur efektin e materialeve mesimore mbi njohuritë mjedisore dhe ndërgjegjësimin te nxenes.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj
(20) Pika 26 eshte e vlefshme per te matur si mesimet e kimise mund te jene efektive ne rritjen e nivelit te ndergjegjesimit mjedisor tek nxenesit.
Po ( ) Jo ( )
Nese mendoni se JO atehere shpjegoni arsyen tuaj

……
……
………..

Appendix P: Teachers External Validity Panel Questionnaire – English

TEACHERS' EKAISQ EXTERNAL VALIDITY PANEL EVALUATION QUESTIONNAIRE

Part I
The evaluator's profile;

(1) Name and Surname: ………………………………………………………………………..
(2) The workplace/ Organization and Position: ………………………………………………………………………………………
(3) Designation: ……………………………………………………………………………….
(4) Discipline: ……………………………………………………………………………………

Part II
The general views of evaluator about Teachers' Environmental Knowledge and Instructional Skills Questionnaire;

(5) Do you think there is ***gender discrimination*** or ***bias*** in the questionnaire?
Yes ( ) No ( )
If you think that there is, please explain its reason
……………………………………………………………………………
………………………………………………………………………………………

(6) Do you think there is ***ethnic/ cultural discrimination*** or ***bias*** in the questionnaire?
Yes ( ) No ( )
If you think that there is, please explain its reason
……………………………………………………………………………
………………………………………………………………………………………

(7) Do you think there is ***social/ regional discrimination*** or ***bias*** in the questionnaire?
Yes ( ) No ( )
If you think that there is, please explain its reason
……………………………………………………………………………
………………………………………………………………………………………

(8) Do you think the survey questions/items are clearly described and easily understandable?
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………
………………………………………………………………………………………

(9) Do you think the questionnaire can be applied in one session (25-35 minutes) and efficient results can be obtained?
Yes ( ) No ( )
If your answer is No, please explain its reason
……………………………………………………………………………
………………………………………………………………………………………

Part III.

Validity of Questionnaire Items;

Please give your opinion about questionnaire items.

(10) Questions 1, 2, and 3 are demographic questions.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

(11) Question 4 is valid to assess which teaching/learning methods were being used during the teaching chemistry.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

(12) Questions 5, 6, and 7 are valid to measure environmental knowledge and awareness level of chemistry teacher.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

(13) Questions 8 and 9 are valid to measure environmental content knowledge level of chemistry teachers.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

(14) Question 10 is valid to measure effect of class 8 and class 9 chemistry curricula on environmental awareness level of students.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

(15) Question 11 is valid to measure what extent class 8 and class 9 chemistry textbooks have content related to the environmental issues.

Yes ( ) No ( )

If your answer is No, please explain its reason

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

(16) Questions 12 – 16 and 17 – 21 are valid to measure what extent chemistry teacher is teaching environmental issues during the chemistry lesson in class 8 and class 9 respectively and are valid to assess which environmental issues, what , and how were being taught by chemistry teachers during the chemistry lesson.

Yes ( ) No ( )

If your answer is No, please explain its reason

………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………

(17) Question 22 is valid to measure obstacles were faced by teachers during the teaching environmental issues to the students.

Yes ( ) No ( )

If your answer is No, please explain its reason

………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………

(18) Question 23 and 24 are valid to measure effect of in-service training on teachers′ content knowledge and environmental awareness.

Yes ( ) No ( )

If your answer is No, please explain its reason

………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………

(19) Item 25 is valid to measure effect of instructional materials on environmental knowledge and awareness of students.

Yes ( ) No ( )

If your answer is No, please explain its reason

………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………

(20) Item 26 is valid to measure how chemistry lessons can be effective to increase environmental awareness level of students.

Yes ( ) No ( )

If your answer is No, please explain its reason

………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………
………………………………………………………………………………

Appendix Q: National Examination Agency (AKP) External Validity Letter

REPUBLIKA E SHQIPËRISË
MINISTRIA E ARSIMIT
DHE SPORTIT

AGJENCIA KOMBËTARE E PROVIMEVE

Nr. 102 Prot. *Tiranë, më 26.05.2015*
(Lutemi referojuni në rast përgjigje)

Lënda: Kërkohet mendim ekspertësh

Drejtuar: **Z. Nihat AKSU**

TIRANË

I nderuar z. Aksu,

Në përgjigje të kërkesës për mendim ekspertësh, lidhur me pyetësorët e përgatitur nga ana juaj, Ju informojmë sa më poshtë:

Specialistët e AKP-së i studiuan me kujdes pyetësorët dhe konstatuan se:

a) Pyetjet e anketës janë të qarta, të kuptueshme dhe të përgatitura sipas nivelit të nxënësve, ku do të aplikohen.
b) Në pyetjet e anketës nuk u vërejtën probleme në lidhje me diskriminimin e gjinisë, etnisë, kulturës apo rajonit.

Jemi të mendimit që anketa është e përshtatshme për t'u aplikuar.

Duke ju falënderuar për bashkëpunimin,

Rezana VRAPI

DREJTORE E PËRGJITHSHME

REPUBLIKA E SHQIPËRISË MINISTRIA E ARSIMIT DHE SPORTIT AGJENCIA KOMBËTARE E PROVIMEVE

Rruga: Naim Frashëri, Nr. 37, Tiranë
Tel/fax.+355 4 2419257
Web site: www.akp.gov.al
E-mail: rezana.vrapi@akp.gov.al

Faqe 1 nga 1

Appendix R: List of Tables

Table 1 Chi-square significance level: comparison of correct responses to the knowledge measuring questions of C8EKAQ and C9EKAQ and respondents' characteristics

	school		Gender		Age		Region	
	Grade 8	Grade 9	Grade 8	Grade 9	Grade 8	Grade 9	Grade 8	Grade 9
Q4		<.01						
Q5	<.01		<.05	<.01			<.01	
Q6	<.05	<.01					<.01	
Q7	<.01	<.01					<.05	<.01
Q14		<.01						<.01
Q15	<.01	<.01	<.05				<.01	<.01
Q16	<.01	<.01						<.01
Q23	<.01	<.01						<.01
Q24a		<.01					<.01	<.01
Q24b	<.01	<.01					<.05	<.01
Q24c	<.01	<.01					<.01	<.01
Q24d	<.01	<.01					<.01	<.01
Q24e		<.01						<.01

Table 2 Class 8 responses to Q11: I have heard about acid rain in the…….(n=914)

		Responses		Percent of Cases
		N	Percent	
	chemistry lesson	741	40.0%	81.1%
	history lesson	16	0.9%	1.8%
	physics lesson	174	9.4%	19.0%
	biology lesson	594	32.1%	65.0%
	geography lesson	317	17.1%	34.7%
	in a school activity	9	0.5%	1.0%
Total		1851	100.0%	202.5%

Table 3 Class 9 responses to Q11: I have heard about acid rain in the…….(n=1505)

	Responses		Percent of Cases
	N	Percent	
chemistry lesson	1146	36.1%	76.1%
history lesson	25	0.8%	1.7%
physics lesson	311	9.8%	20.7%
biology lesson	1155	36.4%	76.7%
geography lesson	520	16.4%	34.6%
in a school activity	17	0.5%	1.1%
Total	3174	100.0%	210.9%

Table 4 Class 8 responses to Q20: I have heard about Ozone Depletion in the……(n=808)

	Responses		Percent of Cases
	N	Percent	
chemistry lesson	480	31.0%	59.4%
history lesson	23	1.5%	2.8%
physics lesson	170	11.0%	21.0%
biology lesson	549	35.4%	67.9%
geography lesson	308	19.9%	38.1%
in a school activity	20	1.3%	2.5%
Total	1550	100.0%	191.8%

Table 5 Class 9 responses to Q20: I have heard about Ozone Depletion in the….(n=1429)

	Responses		Percent of Cases
	N	Percent	
chemistry lesson	1023	34.7%	71.6%
history lesson	58	2.0%	4.1%
physics lesson	436	14.8%	30.5%
biology lesson	973	33.0%	68.1%
geography lesson	429	14.5%	30.0%
a school activity	32	1.1%	2.2%
Total	2951	100.0%	206.5%

Table 6 Class 8 responses to Q28: I have heard about greenhouse effect in the…(n=831)

	Responses		Percent of Cases
	N	Percent	
chemistry lesson	492	30.0%	59.2%
history lesson	28	1.7%	3.4%
physics lesson	200	12.2%	24.1%
biology lesson	579	35.3%	69.7%
geography lesson	335	20.4%	40.3%
school activity	8	0.5%	1.0%
Total	1642	100.0%	197.6%

Table 7 Class 9 responses to Q28: I have heard about greenhouse effect in the…(n=1386)

	Responses		Percent of Cases
	N	Percent	
chemistry lesson	946	32.6%	68.3%
history lesson	59	2.0%	4.3%
physics lesson	427	14.7%	30.8%
biology lesson	989	34.1%	71.4%
geography lesson	458	15.8%	33.0%
school activity	21	0.7%	1.5%
Total	2900	100.0%	209.2%

Table 8 Class 9 responses to Q33: I have heard about “Why are batteries harmful to the environment?” in the…….(n=1245)

	Responses		Percent of Cases
	N	Percent	
chemistry lesson	980	46.7%	78.7%
history lesson	45	2.1%	3.6%
physics lesson	504	24.0%	40.5%
biology lesson	445	21.2%	35.7%
geography lesson	100	4.8%	8.0%
school activity	23	1.1%	1.8%
Total	2097	100.0%	168.4%

Table 9 8th and 9th grade students' responses to the "Other" for Q11,Q20 and Q28

Class 8: Q11. I have heard about Acid Rain in the other lesson, specify

	Frequency	Percent	Valid Percent
skipped	943	97.9	97.9
English	1	.1	.1
Natural Sciences	19	2.0	2.0
Total	963	100.0	100.0

Class 8: Q20. I have heard about Ozone Depletion in the other lesson, specify

	Frequency	Percent	Valid Percent
skipped	950	98.7	98.7
Natural Sciences	13	1.3	1.3
Total	963	100.0	100.0

Class 8: Q28. I have heard about greenhouse Effect in the other lesson, specify

	Frequency	Percent	Valid Percent
skipped	954	99.1	99.1
English	3	.3	.3
Natural Sciences	6	.6	.6
Total	963	100.0	100.0

Class 9: Q11. I have heard about Acid Rain in the other lesson, specify

	Frequency	Percent	Valid Percent
skipped	1580	97.5	97.5
English	26	1.6	1.6
Natural sciences	15	.9	.9
Total	1621	100.0	100.0

Class 9: Q20. I have heard about Ozone Depletion in the other lesson, specify

	Frequency	Percent	Valid Percent
skipped	1575	97.2	97.2
English	18	1.1	1.1
Green pack	23	1.4	1.4
Natural Sciences	5	.3	.3
Total	1621	100.0	100.0

Class 9: Q28. I have heard about greenhouse Effect in the other lesson, specify

	Frequency	Percent	Valid Percent
skipped	1598	98.6	98.6
English	15	.9	.9
Green pack	3	.2	.2

Natural Sciences	5	.3	.3
Total	1621	100.0	100.0

Table 10 Heard in chemistry lesson (Q11, Q20, and Q28): Frequencies and percentages of 8th grade respondents

I have heard about acid rain in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	173	18.0	18.9	18.9
	Yes	741	76.9	81.1	100.0
	Total	914	94.9	100.0	
Missing	skipped	49	5.1		
Total		963	100,0		

I have heard about Ozone Depletion in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	328	34.1	40.6	40.6
	Yes	480	49.8	59.4	100.0
	Total	808	83.9	100.0	
Missing	skipped	155	16.1		
Total		963	100.0		

I have heard about greenhouse effect in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	339	35.2	40.8	40.8
	Yes	492	51.1	59.2	100.0
	Total	831	86.3	100.0	
Missing	skipped	132	13.7		
Total		963	100.0		

Table 11 Heard in chemistry lesson (Q11, Q20, Q28, and Q33): Frequencies and percentages of 9th grade respondents

I have heard about acid rain in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	359	22.1	23.9	23.9
	Yes	1146	70.7	76.1	100.0
	Total	1505	92.8	100.0	
Missing	skipped	116	7.2		
Total		1621	100.0		

I have heard about Ozone Depletion in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	406	25.0	28.4	28.4
	Yes	1023	63.1	71.6	100.0
	Total	1429	88.2	100.0	
Missing	skipped	192	11.8		
Total		1621	100.0		

I have heard about greenhouse effect in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	440	27.1	31.7	31.7
	Yes	946	58.4	68.3	100.0
	Total	1386	85.5	100.0	
Missing	skipped	235	14.5		
Total		1621	100.0		

I have heard about “Why are batteries harmful to the environment?” in the chemistry lesson

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	265	16.3	21.3	21.3
	Yes	980	60.5	78.7	100.0
	Total	1245	76.8	100.0	
Missing	skipped	376	23.2		
Total		1621	100.0		

Table 12 Class 8 responses: Q12. How have you learned acid rain in this lesson?(n=915)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	408	20,8%	44,6%
Our teacher has explained in the class.	770	39,2%	84,2%
Our teacher has given reading and learning materials about acid rain.	226	11,5%	24,7%
I have done a project about acid rain.	429	21,8%	46,9%
We have done an experiment about acid rain.	55	2,8%	6,0%
Our teacher has showed us a video/TV program/Slide about acid rain	38	1,9%	4,2%

Our teacher has organized seminar/ talk by experts	11	0,6%	1,2%
Our teacher has organized fieldwork/ trip/outdoor activity to teach acid rain.	28	1,4%	3,1%
Total	1965	100,0%	214,8%

Table 13 Class 9 responses: Q12. How have you learned acid rain in this lesson?(n=1501)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	619	19,7%	41,2%
Our teacher has explained in the class.	1248	39,7%	83,1%
Our teacher has given reading and learning materials about acid rain.	479	15,2%	31,9%
I have done a project about acid rain.	573	18,2%	38,2%
We have done an experiment about acid rain.	55	1,7%	3,7%
Our teacher has showed us a video/TV program/Slide about acid rain	104	3,3%	6,9%
Our teacher has organized seminar/ talk by experts	26	0,8%	1,7%
Our teacher has organized fieldwork/ trip/outdoor activity to teach acid rain.	40	1,3%	2,7%
Total	3144	100,0%	209,5%

Table 14 Class 8 responses: How have you heard about Ozone Depletion in this lesson?(N=829)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	434	27,2%	52,4%
How have you heard about Our teacher has talked about Ozone Depletion.	722	45,2%	87,1%
Our teacher has given reading and learning materials about Ozone Depletion.	204	12,8%	24,6%
My teacher has given me a project about Ozone Depletion.	125	7,8%	15,1%
Our teacher has done an experiment about Ozone Depletion.	26	1,6%	3,1%

Our teacher has showed us a video/TV program/Slide about Ozone Depletion.	30	1,9%	3,6%
Our teacher has organized seminar/ talk by experts.	19	1,2%	2,3%
Our teacher has organized fieldwork/ trip/outdoor activity to teach Ozone Depletion.	36	2,3%	4,3%
Total	1596	100,0%	192,5%

Table 15 Class 9 responses: How have you heard about Ozone Depletion in this lesson?(N=1424)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	707	24,6%	49,6%
Our teacher has talked about Ozone Depletion.	1171	40,7%	82,2%
Our teacher has given reading and learning materials about Ozone Depletion.	438	15,2%	30,8%
My teacher has given me a project about Ozone Depletion.	319	11,1%	22,4%
Our teacher has done an experiment about Ozone Depletion.	57	2,0%	4,0%
Our teacher has showed us a video/TV program/Slide about Ozone Depletion.	106	3,7%	7,4%
Our teacher has organized seminar/ talk by experts.	43	1,5%	3,0%
Our teacher has organized fieldwork/ trip/outdoor activity to teach Ozone Depletion.	35	1,2%	2,5%
Total	2876	100,0%	202,0%

Table 16 Class 8 responses: How have you heard about greenhouse effect in this lesson?(N=822)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	486	29,0%	59,1%

Our teacher has talked about greenhouse effect.	710	42,3%	86,4%
Our teacher has given reading and learning materials about greenhouse effect.	211	12,6%	25,7%
My teacher has given me a project about greenhouse effect.	163	9,7%	19,8%
We have done an experiment about greenhouse effect.	32	1,9%	3,9%
Our teacher has showed us a video/TV program/Slide about greenhouse effect.	30	1,8%	3,6%
Our teacher has organized seminar/ talk by experts.	29	1,7%	3,5%
Our teacher has organized fieldwork/ trip/outdoor activity to teach greenhouse effect.	16	1,0%	1,9%
Total	1677	100,0%	204,0%

Table 17 Class 9 responses: How have you heard about greenhouse effect in this lesson?(N=1357)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	782	26,7%	57,6%
Our teacher has talked about greenhouse effect.	1133	38,6%	83,5%
Our teacher has given reading and learning materials about greenhouse effect.	426	14,5%	31,4%
My teacher has given me a project about greenhouse effect.	332	11,3%	24,5%
We have done an experiment about greenhouse effect.	74	2,5%	5,5%
Our teacher has showed us a video/TV program/Slide about greenhouse effect.	96	3,3%	7,1%
Our teacher has organized seminar/ talk by experts.	49	1,7%	3,6%
Our teacher has organized fieldwork/ trip/outdoor activity to teach greenhouse effect.	41	1,4%	3,0%
Total	2933	100,0%	216,1%

Table 18 Class 9 responses: How have you learned 'why are batteries harmful to the environment?' in this lesson?(N=1243)

	Responses		Percent of Cases
	N	Percent	
I have read in the textbook.	699	27,2%	56,2%
Our teacher has explained.	1000	38,9%	80,5%
Our teacher has given reading and learning materials.	364	14,2%	29,3%
My teacher has given me a project.	274	10,7%	22,0%
Our teacher has done an experiment.	100	3,9%	8,0%
Our teacher has showed us a video/TV program/Slide.	87	3,4%	7,0%
Our teacher has organized an outdoor activity program.	48	1,9%	3,9%
Total	2572	100,0%	206,9%

Table 19 Crosstabulation for Q12 (grade 8): Teacher explained & used methods.

		Our teacher has explained in the class.(n=770)
		Yes
Our teacher has given reading and learning materials about acid rain.	Yes (%)	181 (23.5%)
I have done a project about acid rain.	Yes (%)	359 (46.6%)
We have done an experiment about acid rain.	Yes (%)	43 (5.6%)
Our teacher has showed us a video/TV program/Slide about acid rain	Yes (%)	27 (3.5%)

Percentages and totals are based on respondents.

Table 20 Crosstabulation for Q21 (grade 8): Teacher explained & used methods.

		Our teacher has talked about ozone depletion.(n=722)
		Yes
Our teacher has given reading and learning materials about Ozone Depletion.	Yes (%)	182 (25.2%)
My teacher has given me a project about Ozone Depletion.	Yes (%)	102 (14.1%)
Our teacher has done an experiment about Ozone Depletion.	Yes (%)	16 (2.2%)
Our teacher has showed us a video/TV program/Slide about Ozone Depletion.	Yes (%)	24 (3.3%)

Percentages and totals are based on respondents.

Table 21 Crosstabulation for Q29 (grade 8): Teacher explained & used methods.

		Our teacher has talked about greenhouse effect.(n=710)
		Yes
Our teacher has given reading and learning materials about greenhouse effect.	Yes (%)	175 (24.6%)
My teacher has given me a project about greenhouse effect.	Yes (%)	139 (19.6%)
We have done an experiment about greenhouse effect.	Yes (%)	20 (2.8%)
Our teacher has showed us a video/TV program/Slide about greenhouse effect.	Yes (%)	22 (3.1%)

Percentages and totals are based on respondents.

Table 22 Crosstabulation for Q12 (grade 9): Teacher explained & used methods.

		Our teacher has explained in the class.(n=1248)
		Yes
Our teacher has given reading and learning materials about acid rain.	Yes (%)	398 (31.9%)
I have done a project about acid rain.	Yes (%)	475 (38.0%)
We have done an experiment about acid rain.	Yes (%)	44 (3.5%)
Our teacher has showed us a video/TV program/Slide about acid rain	Yes (%)	90 (7.2%)

Percentages and totals are based on respondents.

Table 23 Crosstabulation for Q21 (grade 9): Teacher explained & used methods.

		Our teacher has talked about ozone depletion.(n=1171)
		Yes
Our teacher has given reading and learning materials about Ozone Depletion.	Yes (%)	360 (30.7%)
My teacher has given me a project about Ozone Depletion.	Yes (%)	255 (21.8 %)
Our teacher has done an experiment about Ozone Depletion.	Yes (%)	39 (3.3%)
Our teacher has showed us a video/TV program/Slide about Ozone Depletion.	Yes (%)	89 (7.6%)

Percentages and totals are based on respondents.

Table 24 Crosstabulation for Q29 (grade 9): Teacher explained & used methods.

		Our teacher has talked about greenhouse effect.(n=1133)
		Yes
Our teacher has given reading and learning materials about greenhouse effect.	Yes (%)	373 (32.9%)
My teacher has given me a project about greenhouse effect.	Yes (%)	291 (25.7%)
We have done an experiment about greenhouse effect.	Yes (%)	52 (4.6%)
Our teacher has showed us a video/TV program/Slide about greenhouse effect.	Yes (%)	78 (6.9%)

Percentages and totals are based on respondents.

Table 25 Crosstabulation for Q34 (grade 9): Teacher explained & used methods.

		Our teacher has talked about environmental damages of batteries.(n=1000)
		Yes
Our teacher has given reading and learning materials.	Yes (%)	305 (30.5%)
My teacher has given me a project.	Yes (%)	211 (21.1%)
Our teacher has done an experiment.	Yes (%)	66 (6.6%)
Our teacher has showed us a video/TV program/Slide.	Yes (%)	67 (6.7%)

Percentages and totals are based on respondents.

Table 26 Q12 and Q17 Frequencies: In teaching chemistry to the class …….. students, do you teach any environmental issues?

	Responses [a]	
	N	Percent [b]
….. class 8 ……	38	95,0%
….. class 9 ……	39	97,5%

a. Dichotomy group tabulated at value 1 (yes).

b. Valid N=40, missing N=1.

Table 27 Q18 Frequencies: Which environmental issues do you teach in class 9?

		Responses [a]		Percent of Cases [b]
		N	Percent	
Valid	Chemical pollution	17	18.7%	48.6%
	Air pollution	9	9.9%	25.7%
	Ozone layer depletion	9	9.9%	25.7%
	Water pollution	8	8.8%	22.9%
	Global warming	8	8.8%	22.9%
	Disposal of Battery	8	8.8%	22.9%
	Greenhouse effect	7	7.7%	20.0%
	Soil pollution	6	6.6%	17.1%
	Deforestation	6	6.6%	17.1%
	Loss of biodiversity	4	4.4%	11.4%
	Land Pollution	4	4.4%	11.4%
	Recycling	3	3.3%	8.6%
	Acid rain	2	2.2%	5.7%
Total		91	100.0%	260.0%

a. Dichotomy group tabulated at value 1(yes).
b. Valid N=35, missing N=6.

Table 28 Q6 Frequencies: One of my teaching goals of chemistry is the increase students' level of environmental responsibility.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	15	36.6	36.6	36.6
	Strongly Agree	26	63.4	63.4	100.0
	Total	41	100.0	100.0	

Table 29 Q22b Frequencies: The main problems encountered in teaching environmental issues with your class? "lack of preparation time"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	29.3	35.3	35.3
	Disagree	14	34.1	41.2	76.5
	Neutral	3	7.3	8.8	85.3
	Agree	5	12.2	14.7	100.0
	Total	34	82.9	100.0	
Missing	skipped	7	17.1		
Total		41	100.0		

Table 30 Q22f Frequencies: The main problems encountered in teaching environmental issues with your class? "lack of knowledge"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	15	36.6	42.9	42.9
	Disagree	13	31.7	37.1	80.0
	Neutral	3	7.3	8.6	88.6
	Agree	3	7.3	8.6	97.1
	Strongly Agree	1	2.4	2.9	100.0
	Total	35	85.4	100.0	
Missing	skipped	6	14.6		
Total		41	100.0		

Table 31 Q22h Frequencies: The main problems encountered in teaching environmental issues with your class? "not relevant to what I teach"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	26.8	31.4	31.4
	Disagree	16	39.0	45.7	77.1
	Neutral	3	7.3	8.6	85.7
	Agree	4	9.8	11.4	97.1
	Strongly Agree	1	2.4	2.9	100.0
	Total	35	85.4	100.0	
Missing	skipped	6	14.6		
Total		41	100.0		

Table 32 Q26 Frequencies: What could be done to improve environmental awareness?

	Responses [a]		Percent of Cases [b]
	N	Percent	
Providing supplementary materials/kits	24	11.2%	61.5%
Development of curriculum	21	9.8%	53.8%
Training the teachers	29	13.6%	74.4%
Improvement of textbook	22	10.3%	56.4%
Cooperation with local community	18	8.4%	46.2%
Field trips	25	11.7%	64.1%
Conferences/seminars	13	6.1%	33.3%
Inviting experts in the classroom	12	5.6%	30.8%
Experiments/Projects	25	11.7%	64.1%
Teacher-centered teaching	3	1.4%	7.7%
Active student-centered teaching	17	7.9%	43.6%
Cooperation with NGOs	5	2.3%	12.8%
Total	214	100.0%	548.7%

a. Dichotomy group tabulated at value 1 (yes).
b. Valid N=39, missing N=2.

Table 33 Combined logistic regression results of grade 8: Ways to learn (IVs)

Variables in the Equation

Acid rain (cause) (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
acidrainQ12teach	-.382	.193	3.934	1	.047	.682
acidrainQ12exp	-.623	.281	4.916	1	.027	.536
Ozone depletion cause (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
ozonQ21pro	-.568	.239	5.670	1	.017	.567
Ozone depletion consequences (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
ozonQ21tea	.855	.212	16.226	1	.000	2.351
ozonQ21read	.565	.180	9.846	1	.002	1.759
Greenhouse effect cause (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
greenQ29pro	.461	.234	3.873	1	.049	1.585
greenQ29sem	-1.352	.389	12.089	1	.001	.259

Table 34 Combined logistic regression results of grade 9: Ways to learn (IVs)

Variables in the Equation

Acid rain (cause) (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
acidrainQ12read	.461	.142	10.622	1	.001	1.586
acidrainQ12trip	-1.245	.326	14.563	1	.000	.288
Ozone depletion cause (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
ozonQ21txt	.346	.129	7.232	1	.007	1.413
Ozone depletion consequences (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
ozonQ21txt	.495	.116	18.215	1	.000	1.640
ozonQ21tea	.600	.148	16.424	1	.000	1.822
ozonQ21read	.375	.130	8.354	1	.004	1.455
ozonQ21pro	.911	.156	34.032	1	.000	2.486
ozonQ21trip	-1.142	.372	9.402	1	.002	.319
Greenhouse effect cause (DV)	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
greenQ29tea	.718	.160	20.133	1	.000	2.050
greenQ29read	.300	.149	4.018	1	.045	1.349
greenQ29pro	.563	.168	11.161	1	.001	1.756
greenQ29trip	-1.283	.335	14.713	1	.000	.277

Damages of batteries (DV)	B	S.E.	Wald	df	Sig.	Exp(B)
batQ34txt	.610	.193	10.033	1	.002	1.841
batQ34tea	.876	.210	17.463	1	.000	2.402
batQ34read	-.458	.202	5.147	1	.023	.632
batQ34pro	.682	.261	6.813	1	.009	1.979
batQ34show	-.861	.306	7.945	1	.005	.423

Table 35 Logistic regression Wald statistics: grade 8 students' awareness (Q32-DV) and teacher explained (IV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12teach	.130	.184	.497	1	.481	1.139
	Constant	.128	.169	.574	1	.449	1.136

a. Variable(s) entered on step 1: acidrainQ12teach.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozoneQ21tea	.624	.215	8.413	1	.004	1.867
	Constant	-.299	.201	2.211	1	.137	.741

a. Variable(s) entered on step 1: ozonQ21tea.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	greenQ29tea	.578	.208	7.739	1	.005	1.782
	Constant	-.240	.193	1.543	1	.214	.787

a. Variable(s) entered on step 1: greenQ29tea.

Table 36 Logistic regression Wald statistics: grade 8 students' awareness (Q32-DV) and teacher explained (IV) in chemistry lesson (SV)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	acidrainQ12teach	.134	.207	.419	1	.517	1.143
	Constant	.143	.189	.570	1	.450	1.154

a. Variable(s) entered on step 1: acidrainQ12teach.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozoneQ21tea	.608	.314	3.756	1	.053	1.837
	Constant	-.262	.297	.778	1	.378	.769

a. Variable(s) entered on step 1: ozonQ21tea.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	greenQ29tea	.543	.272	3.977	1	.046	1.721
	Constant	-.315	.253	1.550	1	.213	.730

a. Variable(s) entered on step 1: greenQ29tea.

Table 37 Frequencies of environmental objectives in each curriculum

	Total Number of Objectives	Number of Environmental Objectives	Percentage of Environmental Objectives	Related Environmental Problems
Class 8				
Biology	59	2	3.4 %	Loss of Biodiversity
Civic Education	20	5	25 %	Pollution, Loss of Biodiversity
Physics	94	4	4.2 %	Noise Pollution
Geography	54	7	12.9 %	Population, Pollution, Loss of Biodiversity
Albanian Language*	16	2	12.5 %	Loss of Biodiversity
History	116	3	2.5 %	Global Warming, Greenhouse Effect
Chemistry	61	4	6.5 %	Acid Rain, Chemical Pollution, Air Pollution
Total	**420**	**27**	**6.4 %**	**-**
Class 9				
Biology	42	-	0.0 %	-
Civic Education	37	-	0.0 %	-
Physics	77	1	14.2 %	Global Warming
Geography	64	15	23.4 %	Water Pollution, Soil and Land Pollution, Population, Loss of Biodiversity, Deforestation
Albanian Language*	12	1	8.3 %	Environmental problems
History	121	-	0.0 %	-
Chemistry	148	5	3.4 %	Battery Pollution, Chemical Pollution, Ozone Depletion
Total	**501**	**22**	**4.4 %**	

Only general objectives

Table 38 Class 8 Number of environmental topics and percentage in each approved selected textbooks

Textbook	Publisher	Author/ Authors	Teachers' Selections percentage & number of teachers	Total Number of Topics	Number of Environmental Topics and Percentage	Environmental Problems
Albanian Language 8	Albas	Rita Petro Adelina Çerpja Idriz Metani	99 % 1689 (1710)	79	-	-
Civic Education 8	Albas	Edlira Haxhiymeri I. Tahsini E. Dhëmbo J. Ajdini, V. Duci	91 % 1409 (1555)	25	5 (20.0%)	global problems, population natural resources, environmental pollution
History 8	Albas	Menduh Dërguti, Tomi Treska	82 % 1255 (1527)	60	1 (1.7 %)	land pollution greenhouse effect air pollution
History 8	Ideart	Llambro Filo	11 % 170(1527)	60	2 (3.3 %)	global warming, greenhouse effect
Geography 8	Ideart	Agron Nishku	90 % 1396(1545)	54	5 (9.3 %)	Population water pollution air pollution, acid rain, deforestation soil pollution
Biology 8	Mediaprint	Ethem Ruka, Fatbardh Sokoli	78% 1331 (1581)	46	-	-
Biology 8	Albas	Fatmira Zenelaj, Diana Dhima	12% 192 (1581)	54	1 (1.8 %)	loss of biodiversity
Chemistry 8	Botime Pegi	Nina Guga	32% 486 (1539)	21	1 (4.8 %)	acid rain
Chemistry 8	Albas	Lumturi Xhezo, Rajmonda Lilo	22% 342 (1539)	22	2 (9.0 %)	ozone depletion, acid rain
Chemistry 8	Mediaprint	Veronika Haxhistasa Jalldyz Xhemalaj	20 % 313(1539)	35	3 (8.6 %)	acid rain ozone depletion greenhouse effect
Chemistry 8	Dita 2000	Aishe Hajredini, Kristaq Lula	13 % 198(1539)	23	2 (8.7 %)	water pollution soil pollution air pollution
Chemistry 8	Uegen	Palush Gjogu, Mirela Piti	10 % 148(1539)	23	1 (4.3 %)	acid rain
Physics 8	Erik	Zenun Mulaj, Kristaq Piti Fatos Mustafaj	60 % 925(1539)	38	1 (2.6 %)	noise pollution
Physics 8	Botime Pegi	Polikron Dhoqina Valbona Agolli	28 % 432(1539)	45	1 (2.2 %)	noise pollution

Table 39 Class 9 Number of environmental topics and percentage in each approved selected textbooks

Textbook	Publisher	Author/ Authors	Teachers' Selections percentage & number of teachers	Total Number of Topics	Number of Environmental Topics and Percentage	Environmental Problems
Albanian Language 9	Albas	Rita Petro Adelina Çerpja Idriz Metani	93 % 1568 (1694)	66	2 (3%)	water pollution loss of biodiversity
Civic Education 9	Albas	Juliana Ajdini Veronika Duci	86 % 1328 (1551)	21	-	-
History 9	Albas	Menduh Dërguti Sonila Boçi Ledia Dushku	78 % 1170 (1501)	57	-	-
History 9	Ideart	Llambro Filo, Fatmira Mulliçi	11 % 167(1501)	57	-	-
Geography 9	Ideart	Perikli Qiriazi, Dhimitër Doka, Asllan Pushka	89 % 1397(1574)	48	2 (4.1 %)	air pollution soil pollution
Biology 9	Mediaprint	Ethem Ruka, Drita Nashi	53% 810 (1535)	49	-	-
Biology 9	Albas	Fatmira Zenelaj, Diana Dhima	17% 264 (1535)	49	-	-
Biology 9	D & U	Fatbardh Sokoli, Aurora Dibra	15% 229 (1535)	53	-	-
Biology 9	Morava	Luan Memushi	15% 228 (1535)	60	-	-
Chemistry 9	Botime Pegi	Nina Guga	45 % 678(1522)	48	2 (4.1 %)	ozone depletion water pollution
Chemistry 9	Albas	Lumturi Xhezo, Rajmonda Lilo	23 % 353(1522)	38	2 (5.2 %)	battery pollution soil pollution ozone depletion water pollution air pollution
Chemistry 9	Mediaprint	Jalldyz Xhemalaj, Veronika Haxhistasa	17 % 259(1522)	47	2 (4.2 %)	ozone depletion water pollution
Physics 9	Erik	Zenun Mulaj, Kristaq Piti Fatos Mustafaj	58 % 906(1549)	30	1 (3.3 %)	global warming
Physics 9	Botime Pegi	Burhan Tabaku, Ilir Vullkaj, Shpresa Gorana	29 % 449(1549)	35	1 (2.9 %)	global warming

Table 40 Do you think class 8 and class 9 textbooks have satisfied content

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	2.4	2.4	2.4
	Dissatisfied	7	17.1	17.1	19.5
	Unsure	6	14.6	14.6	34.1
	Satisfied	24	58.5	58.5	92.7
	Very satisfied	3	7.3	7.3	100.0
	Total	41	100.0	100.0	

Table 41 What could be done to improve environmental awareness? Improvement of textbook

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	46.3	46.3	46.3
	Yes	22	53.7	53.7	100.0
	Total	41	100.0	100.0	

Table 42 Do you think class 8 and class 9 textbooks have satisfied content * What could be done to improve environmental awareness? Improvement of textbook Crosstabulation

		What could be done to improve environmental awareness? Improvement of textbook		Total
		No	Yes	
Do you think class 8 and class 9 textbooks have satisfied content	Very dissatisfied	0	1	1
	Dissatisfied	1	6	7
	Unsure	3	3	6
	Satisfied	13	11	24
	Very satisfied	2	1	3
Total		19	22	41

Table 43 Problems encountered in teaching environmental issues-instructional materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	4.9	5.3	5.3
	Disagree	3	7.3	7.9	13.2
	Neutral	6	14.6	15.8	28.9
	Agree	19	46.3	50.0	78.9

	Strongly Agree	8	19.5	21.1	100.0
	Total	38	92.7	100.0	
Missing	skipped	3	7.3		
Total		41	100.0		

Table 44 Regression results of grade 8: cause (Q5) of acid rain (DV) and how learned (source) (Q9-IV)

Variables in the Equation

Grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	acidrainQ9magzn	-.539	.227	5.638	1	.018	.583
	acidrainQ9book	-.430	.135	10.125	1	.001	.651
	Constant	.619	.094	43.604	1	.000	1.858

Table 45 Regression results of grade 8 and grade 9: cause (Q15) of ozone depletion (DV) and how learned (source) (Q18-IV)

Variables in the Equation

grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	ozonQ18tv	-.325	.159	4.191	1	.041	.723
	ozonQ18int	.684	.152	20.306	1	.000	1.981
	Constant	-1.113	.113	96.862	1	.000	.329
grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	ozonQ18book	.347	.130	7.083	1	.008	1.414
	Constant	-1.321	.080	275.150	1	.000	.267

Table 46 Regression results of grade 8 and grade 9: consequences (Q16) of ozone depletion (DV) and how learned (source) (Q18-IV)

Variables in the Equation

grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozonQ18int	.545	.141	15.029	1	.000	1.725
	Constant	.252	.089	7.989	1	.005	1.287
grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	ozonQ18tv	.731	.116	39.873	1	.000	2.078
	Constant	-.389	.209	3.450	1	.063	.678

Table 47 Regression results of grade 8 and grade 9: what cause (Q23) to greenhouse effect (DV) and how learned (source) (Q26-IV)

Variables in the Equation

grade 8	B	S.E.	Wald	df	Sig.	Exp(B)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 3[a]	greenQ26int	.537	.172	9.757	1	.002	1.711
	Constant	.371	.352	1.110	1	.292	1.449
grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 3[a]	greenQ26tvr	.484	.129	14.025	1	.000	1.622
	Constant	-.355	.229	2.418	1	.120	.701

Table 48 Regression results of grade 9: actions (cure) (Q35) to reduce environmental damages of batteries (DV) and how learned (sources) (Q31-IVs)

Variables in the Equation

grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	batQ31int	.581	.191	9.220	1	.002	1.788
	Constant	1.929	.109	315.687	1	.000	6.885

Table 49 Regression results of grade 8 and grade 9: students' awareness (Q32/38-DV) and how learned (source) (Q9-IV)

Variables in the Equation

grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
	acidrainQ9newp	-.668	.330	4.094	1	.043	.513
	Constant	-.865	.421	4.212	1	.040	.421
grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
	acidrainQ9tv	.241	.121	3.962	1	.047	1.272
Step 2[a]	acidrainQ9book	.540	.112	23.302	1	.000	1.715
	Constant	-.180	.073	6.160	1	.013	.835

Table 50 Regression results of grade 8 and grade 9: students' awareness (Q32/38-DV) and how learned (source) (Q18-IV)

Variables in the Equation

grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozonQ18tv	.329	.141	5.464	1	.019	1.390
	Constant	.096	.085	1.298	1	.254	1.101
grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ozonQ18book	.407	.113	12.868	1	.000	1.502
	Constant	-.037	.066	.314	1	.575	.964

Table 51 Regression results of grade 8 and grade 9: students' awareness (Q32/38-DV) and how learned (source) (Q26-IV)

Variables in the Equation

grade 8		B	S.E.	Wald	df	Sig.	Exp(B)
Step 2[a]	greenQ26book	.439	.143	9.438	1	.002	1.551

		B	S.E.	Wald	df	Sig.	Exp(B)
	Constant	.085	.086	.969	1	.325	1.089
grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 3[a]	greenQ26mag	.526	.183	8.275	1	.004	1.693
	greenQ26book	.441	.122	13.163	1	.000	1.554
	Constant	-.058	.069	.711	1	.399	.944

Table 52 Regression results of grade 8 and grade 9: students' awareness (Q32/38-DV) and how learned (source) (Q31-IV)

Variables in the Equation

grade 9		B	S.E.	Wald	df	Sig.	Exp(B)
Step 4[a]	batQ31news	-.404	.198	4.178	1	.041	.667
	batQ31soc	.627	.199	9.895	1	.002	1.871
	batQ31book	.326	.134	5.964	1	.015	1.386
	Constant	-.018	.067	.073	1	.787	.982

Table 53 Which activities students conduct at school/at home in class 8? **Frequencies**

		Responses[b]		Percent of Cases
		N	Percent	
$q16[a]	recycle project	6	9.0%	18.2%
	planting	9	13.4%	27.3%
	poster design	6	9.0%	18.2%
	community awareness	4	6.0%	12.1%
	excursion	8	11.9%	24.2%
	competition	2	3.0%	6.1%
	experiment	2	3.0%	6.1%
	cleaning	10	14.9%	30.3%
	slide/video/short movie	4	6.0%	12.1%
	exhibition	2	3.0%	6.1%
	project	14	20.9%	42.4%
Total		67	100.0%	203.0%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=33, missing N=8

Table 54 Which activities students conduct at school/at home in class 9?**Frequencies**

		Responses[b]		Percent of Cases
		N	Percent	
$q21[a]	recycle project	3	5.2%	9.7%
	planting	9	15.5%	29.0%
	poster design	7	12.1%	22.6%
	community awareness	7	12.1%	22.6%
	excursion	4	6.9%	12.9%
	competition	2	3.4%	6.5%

		N	Percent	Percent of Cases
	experiment	2	3.4%	6.5%
	cleaning	8	13.8%	25.8%
	slide/video/short movie	6	10.3%	19.4%
	exhibition	1	1.7%	3.2%
	project	9	15.5%	29.0%
Total		58	100.0%	187.1%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=31, missing N=10

Table 55 What could be done to improve environmental awareness? **Frequencies**

		Responses[b]		Percent of Cases
		N	Percent	
$q26[a]	Providing supplementary materials/kits	24	11.2%	61.5%
	Development of curriculum	21	9.8%	53.8%
	Training the teachers	29	13.6%	74.4%
	Improvement of textbook	22	10.3%	56.4%
	Cooperation with local community	18	8.4%	46.2%
	Field trips	25	11.7%	64.1%
	Conferences/seminars	13	6.1%	33.3%
	Inviting experts in the classroom	12	5.6%	30.8%
	Experiments/Projects	25	11.7%	64.1%
	Teacher-centered teaching	3	1.4%	7.7%
	Active student-centered teaching	17	7.9%	43.6%
	Cooperation with NGOs	5	2.3%	12.8%
Total		214	100,0%	548.7%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=39, missing N=2

Table 56 Environmental programs organized in the school **Frequencies**

Grade 8		Responses		Percent of Cases
		N	Percent	
$q30[a]	talk by experts	103	7.0%	11.6%
	seminar	74	5.0%	8.3%
	discussion	576	39.1%	64.8%
	quiz competition	110	7.5%	12.4%
	essay competition	136	9.2%	15.3%
	experiments	122	8.3%	13.7%
	science projects	293	19.9%	33.0%
	nothing organized	60	4.1%	6.7%

Total	1474	100,0%	165.8%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=889, missing N=74

Table 57 Environmental programs organized in the school **Frequencies**

Grade 9		Responses		Percent of Cases
		N	Percent	
$q36[a]	talk by experts	310	10.8%	20.6%
	seminar	131	4.6%	8.7%
	discussion	860	29.9%	57.3%
	quiz competition	189	6.6%	12.6%
	essay competition	293	10.2%	19.5%
	experiments	292	10.1%	19.4%
	science projects	648	22.5%	43.1%
	nothing organized	155	5.4%	10.3%
Total		2878	100,0%	191.6%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=1502, missing N=119

Table 58 Have you participated any **Frequencies**

Grade 8		Responses		Percent of Cases
		N	Percent	
$q31[a]	environmental trip?	662	30.0%	73.8%
	nature camps?	233	10.6%	26.0%
	cleaning program?	786	35.6%	87.6%
	other outdoor activities?	526	23.8%	58.6%
Total		2207	100,0%	246.0%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=897, missing N=66

Table 59 Have you participated any **Frequencies**

Grade 9		Responses		Percent of Cases
		N	Percent	
$q37[a]	environmental trip?	1134	29.6%	76.3%
	nature camps?	591	15.4%	39.7%
	cleaning program?	1337	34.9%	89.9%
	other outdoor activities?	767	20.0%	51.6%
Total		3829	100,0%	257.5%

a. Dichotomy group tabulated at value 1.
b. Cases: valid N=1487, missing N=134

Appendix S: Curriculum Analysis Instrument

Class: Subject:

1. What is the total number of objectives of curriculum? ……………………….

2. What are the objectives of curriculum which are related to the environmental problems?

…………………………………………………………………………………………
………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
……………………………………………………………………………………..
…………………………………………………………………………………….
………………………………………………………………………………………
…………………………………………………………………………………………
……………………………………………………………………………………
…………………………………………………………………………………………
……………………………………………………………………………………
…………………………………………………………………………………………
…………………………………………………………………………………………
………………………………………………………………………………………..
………………………………………………………………………………………….
…………………………………………………………………………………………
…………………………………………………………………………………………

3. What is the total number of environmental objectives of curriculum? ……………….

4. What are the environmental problems which were mentioned in the environmental objectives of curriculum?

…………………………………………………………………………………………
………………………………………………………………………………………
…………………………………………………………………………………………
……………………………………………………………………………………..
………………………………………………………………………………………..

Appendix T: Textbook Analysis Instrument

Textbook: ……………………………………………

Publisher: ……………………………………………

Author/Authors: ………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

1. What is the total number of topics in the textbook? …………………………………

2. What is the total number of environmental topics in the textbook? …………………...

3. What are the environmental topics of textbook?

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

4. What are the environmental problems which were mentioned in environmental topics (question 3) of textbook?

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

……………………………………………………………………………………………….

Appendix U: Teachers' Responses to Open-ended Questions 13 & 18

Question 13: Which environmental issues do you teach in Class 8?

Teacher 1	air pollution
	acid rain
Teacher 2	deforestation
	erosion
	loss of biodiversity
Teacher 3	acid rain
	greenhouse effect
	ozone depletion
Teacher 4	acid rain
Teacher 5	air pollution
	water pollution
	acid rain
	greenhouse effect
	damages of battery
teacher 6	air pollution
	water pollution
	acid rain
	greenhouse effect
	global warming
teacher 7	acid rain
	air pollution
	water pollution
teacher 8	acid rain
	greenhouse effect
teacher 9	acid rain
	greenhouse effect
	ozone depletion
teacher 10	cleaning
teacher 11	air pollution
	acid rain
	recycling
	industrial pollution
teacher 12	global warming
	water pollution
	biodiversity
teacher 13	air pollution
	acid rain
teacher 14	blank
teacher 15	chemicals which are pollute environment
	what cause the production of environmental problem causing chemicals

teacher 16	acid rain
	industrial pollution
teacher 17	acid rain
	global warming
	greenhouse effect
	ozone depletion
teacher 18	global warming
	chemical pollution
teacher 19	inorganic chemical pollution
	acid rain
teacher 20	air pollution
	water pollution
	soil pollution
	biodiversity
	ozone depletion
teacher 21	greenhouse effect
	global warming
	acid rain
	chemical pollution
	water pollution
teacher 21b	blank
teacher 22	global warming
	recycling
	biodiversity
teacher 23	greenhouse effect
	ozone depletion
	acid rain
teacher 24	ozone depletion
	chemical pollution
teacher 25	global warming
	biodiversity
	urbanism
teacher 26	acid rain
	greenhouse effect
teacher 27	water pollution
	soil pollution
	air pollution
teacher 28	water pollution
	greenhouse effect
	global warming
	acid rain
	ozone depletion
	air pollution
	recycling
	chemical pollution

teacher 29	blank
teacher 29 b	local pollution problems
teacher 30	acid rain
	greenhouse effect
	air pollution
	water pollution
	ozone depletion
teacher 31	air pollution
	water pollution
	chemical pollution
teacher 32	water pollution
	air pollution
	soil pollution
teacher 33	waste pollution
	air pollution
teacher 34	acid rain
teacher 35	acid rain
	chemical pollution
teacher 36	global warming
	air pollution
	water pollution
	recycling
	biodiversity
teacher 37	garbage pollution
teacher 38	environmental pollution
	air pollution
teacher 39	green house
	acid rain
	air pollution
	ozone depletion

Question 18: Which environmental issues do you teach in Class 9?

Teacher 1	soil pollution
	air pollution
	water pollution
	ozone depletion
	global warming
Teacher 2	recycling
Teacher 3	green house effect
	ozone depletion
Teacher 4	blank
Teacher 5	air pollution
	chemical pollution
	toxic chemicals pollution

	battery pollution
teacher 6	pollution
	industrial pollution
teacher 7	green house effect
	ozone depletion
	global warming
teacher 8	battery pollution
	chemical pollution
teacher 9	waste pollution
teacher 10	global problems
teacher 11	soil pollution
	water pollution
	chemical pollution
	battery pollution
teacher 12	biodiversity
	global warming
	deforestation
teacher 13	cleaning class
teacher 14	blank
teacher 15	gas emissions
	dust pollution
	industrial pollution
	toxic chemicals pollution
	water pollution
teacher 16	ozone depletion
	hydrocarbons causing pollution
teacher 17	deforestation
	pollution
teacher 18	health problems caused by environmental pollution
teacher 19	hydrocarbons causing pollution
	battery pollution
teacher 20	air pollution
teacher 21	ozone depletion
	chemical pollution
teacher 21b	green house effect
	environmental pollution
teacher 22	deforestation
	biodiversity
	air pollution
	water pollution
	global warming
	soil pollution
teacher 23	battery pollution
	recycling batteries

teacher 24	water pollution
	air pollution
	green house effect
	chemical pollution
teacher 25	deforestation
	global warming
	biodiversity
teacher 26	ozone depletion
	battery pollution
	environmental pollution
teacher 27	air pollution
	water pollution
teacher 28	water pollution
	greenhouse effect
	global warming
	acid rain
	ozone depletion
	air pollution
	recycling
	chemical pollution
teacher 29	chemical pollution
	industrial pollution
	ozone depletion
teacher 29 b	blank
teacher 30	acid rain
	greenhouse effect
	air pollution
	water pollution
	ozone depletion
teacher 31	battery pollution
	hydrocarbons pollution
teacher 32	heavy metal pollution
	hydrocarbons pollution
teacher 33	battery pollution
	hydrocarbons pollution
	chemical pollution
teacher 34	chemical pollution
teacher 35	chemical pollution
teacher 36	deforestation
	global warming
teacher 37	deforestation
	global warming
	biodiversity
teacher 38	chemical pollution
teacher 39	green house

Appendix V: Teachers' Responses to Open-ended Questions 14 & 19

Question 14: What do you teach concerning these environmental issues in Class 8?

Teacher 1	
	What is air pollution
	how is the air pollution forms
	exhaust gases
	how does acid rain forms
	what causes the acid rain
	how a rain can called as an acid rain
	effect of acid rain on humans, plants and animals
Teacher 2	how can we protect the environment
	effects of pollution
	diseases caused by pollution
Teacher 3	how acid rain formed
	gases that cause acid rain
	damages of acid rain on living and non-living
	damages of acid rain locally
Teacher 4	explain acid rain formation
	damages to the human beings, living organisms
Teacher 5	how effecting
	how can be protected
	what is acid rain
	what is global warming
teacher 6	classification of chemicals which are pollution environment
	what causes ozone depletion
	recycling
teacher 7	how they are form
	consequences
	protection -precaution
teacher 8	which are the causes of acid rain
	how can environment be protected
	how can we stop pollution
teacher 9	what cause ozone destruction
	which chemicals cause ozone depletion
	how acid rain formed
	causing greenhouse gas
teacher 10	how to keep green environment
	how to handle battery disposals
teacher 11	how to protect soil
	how to protect air
	how to protect water
	how to recycle

	how to reduce industrial pollution
	car emissions and their effects
teacher 12	what cause water pollution
	how to encourage people for planting
	consequences of global warming
teacher 13	how important forestation
teacher 14	blank
teacher 15	how chemicals cause water pollution
	what causes acid rain
	what causes global warming
	what causes greenhouse effect
teacher 16	how to eliminate industrial pollution
teacher 17	how acid rain formed
	what cause atmosphere pollution
	the importance of ozone layer
	chemicals that cause ozone hole
teacher 18	consequences of global warming
	what should we do protect environment
teacher 19	how does acid rain forms
	what cause acid rain
	how can acid rain problem be reduced
teacher 20	what cause air pollution
	what cause water pollution
	what cause soil pollution
	what cause ozone depletion
teacher 21	how acid rain formed
	what is the green house effect
	what is the chemical pollution
	how water pollution happens
teacher 21b	blank
teacher 22	teach consequences of global warming
	finding alternative energy sources
	role of human in environmental protection
	deforestation
teacher 23	general information about acid rain, ozone, green house
teacher 24	what cause ozone hole
	what consequences ozone depletion
	what cause chemical pollution
	what consequences chemical pollution
teacher 25	what are the causes pollution
	how to save animals and plants
	effects of deforestation
	human role in environmental protection
teacher 26	how acid rain formed

	what is greenhouse effect
teacher 27	how to keep environment clean
	classify recyclable waste
teacher 28	consequences of global warming
	consequences of acid rain
	greenhouse consequences
	air pollution consequences
	ozone consequences
	chemical pollution consequences
teacher 29	blank
teacher 29 b	what causes local pollution
teacher 30	blank
teacher 31	how acid rain formed
teacher 32	what is pollution
	what is acid rain
	consequences of acid rain
	consequences of chemical pollution
teacher 33	blank
teacher 34	how acid rain formed
	consequences of acid rain
teacher 35	how effect acid rain
	how effect chemical pollution
teacher 36	cause global warming
	consequences global warming
	cause air pollution
	cause water pollution
	cause soil pollution
teacher 37	how to maintain clean environment
teacher 38	what cause air pollution
teacher 39	what cause air pollution
	what cause greenhouse effect
	what cause acid rain
	what cause ozone hole
	how to minimize air pollution
	how to minimize green house
	how to minimize acid rain
	how to minimize ozone hole

Question 19: What do you teach concerning these environmental issues in Class 9?

Teacher 1	
	types of pollution
	what causes soil air and water pollution
	role of ozone
	factors effecting ozone layer

	what causes ozone depletion
Teacher 2	protecting environment
	how awareness can be increased
	contribution of people on environmental issues
Teacher 3	what cause ozone depletion
	what global warming cause
	effects of ultraviolet lights
	how to protect ozone
Teacher 4	blank
Teacher 5	recycling batteries
	recycling
	pesticide usage
	using public or environment friendly transports
teacher 6	what cause acid rain
	what cause global warming
	climate changing
teacher 7	triggering
	consequences
	protection
teacher 8	reducing using diesel cars
	throw batteries to the battery collecting bins
teacher 9	waste management
teacher 10	how to attend environment activities
	the role of forests
	risks of using fuels
teacher 11	battery recycling
	how hydrocarbons pollute environment
teacher 12	consequences of deforestation
	consequences of global warming
teacher 13	teaching hygiene
teacher 14	blank
teacher 15	what cause air pollution
	consequences of toxic pollution
	consequences of water pollution
	consequences of industrial pollution
teacher 16	negative effects of using hydrocarbons to the environment
	what cause ozone hole
	how ozone problem can be reduced
teacher 17	how to protect green
	how to increase green areas
	how to keep environment clean
teacher 18	air pollutants cause respiration problems
teacher 19	damages of battery pollution
	effects of hydrocarbon pollution

teacher 20	consequences of air pollution
teacher 21	what is the ozone layer
	what are the consequences of ozone hole
teacher 21b	what cause greenhouse
	how effect green house
	how can greenhouse effect minimized
teacher 22	consequences of global warming
	how to preserve biodiversity
	what are the consequences of deforestation
teacher 23	how batteries effect environment
teacher 24	causes of greenhouse
	causes of air pollution
	causes of water pollution
	causes of chemical pollution
	consequences of greenhouse
	consequences of air pollution
	consequences of water pollution
	consequences of chemical pollution
	how to minimize of greenhouse
	how to minimize of air pollution
	how to minimize of water pollution
	how to minimize of chemical pollution
teacher 25	consequences of global warming
	protect biodiversity
	protect green areas
teacher 26	what cause ozone hole
	battery types
teacher 27	talk about pollution
teacher 28	consequences of global warming
	consequences of acid rain
	greenhouse consequences
	air pollution consequences
	ozone consequences
	chemical pollution consequences
teacher 29	effects of gas emissions
	effect of U.V light
	effects of cfc
	effects of organic chemicals
teacher 29 b	blank
teacher 30	blank
teacher 31	how battery pollution effect human beings animals plants
	how hydrocarbon pollution effect us
teacher 32	what cause heavy metal pollution
	consequences of heavy metal pollution

	how to minimize heavy metal pollution effect
teacher 33	blank
teacher 34	consequences of chemical pollution
teacher 35	consequences of air pollution
	consequences of water pollution
teacher 36	consequences of deforestation
	consequences of global warming
teacher 37	consequences of global warming
	protecting green
	protecting biodiversity
teacher 38	consequences of chemical pollution
teacher 39	what cause green house effect

Appendix W: Teachers' Responses to Open-ended Questions 15 & 20

Question 15: How do you teach these environmental issues in Class 8?

Teacher1	lecture
	experiment
	group project
	activity
Teacher 2	discussion
	research projects
Teacher 3	discussion
	internet search projects
	hands on projects
	science project
Teacher 4	discussion
	internet searching
Teacher 5	lecture
	internet supported information giving
teacher 6	explain how to be contributed
teacher 7	projects
	discussion
	excursion
	activities with community
teacher 8	discussion
teacher 9	discussion
teacher 10	video
	excursion
	conversation with specialist
teacher 11	blank
teacher 12	internet
	magazine
	textbook
	lecture
teacher 13	discussion
	lecture
teacher 14	blank
teacher 15	projects
	video
teacher 16	experiment
	discussion
teacher 17	discussion
	internet
teacher 18	explain causes and consequences
	giving examples

	projects
teacher 19	lecture
	photo showing
teacher 20	discussion
	projects
	activate
	lecture
teacher 21	experiment
	trip
teacher 21b	blank
teacher 22	projects
	media
	internet
	books magazines
teacher 23	group discussion
	projects
teacher 24	lecture
	projects
	internet searching
teacher 25	projects
	magazines
	books magazines
	internet
teacher 26	lecture
	experiment
	curricular projects
	activities
teacher 27	blank
teacher 28	lecture
teacher 29	blank
teacher 29 b	activate
teacher 30	blank
teacher 31	project
	discussion
teacher 32	lecture
	project
	experiment
teacher 33	lecture
teacher 34	internet
teacher 35	project
teacher 36	projects
	TV documentary
	internet
	magazines
teacher 37	projects

	research
	reading assignments
teacher 38	group project
teacher 39	experiment
	video

Question 20: How do you teach these environmental issues in Class 9?

Teacher 1	lecture
	slide
	journal
	internet
	newspaper
Teacher 2	trip
Teacher 3	discussion
	written project
Teacher 4	blank
teacher 5	discussion
	lecture
	internet using
	posters
teacher 6	blank
teacher 7	projects
	video/slide/programs
teacher 8	discussion
teacher 9	discussion
teacher 10	discussion
	using photos
	excursion
	lectures
teacher 11	blank
teacher 12	internet
	magazine
	textbook
	lecture
teacher 13	trip to nature
teacher 14	blank
teacher 15	discussion
	debate
	projects
	lecture
	group project
teacher 16	experiment
	discussion

	lecture
teacher 17	discussion
	internet using
	participation of activities
teacher 18	blank
	battery collecting
teacher 19	activity
	demonstration
	experiment
teacher 20	blank
teacher 21	experiment
teacher 21b	lecture
	internet using
	magazines
	field work
teacher 22	internet
	media TV documentary
	lecture
teacher 23	group discussion
	projects
teacher 24	lecture
	projects
	internet searching
teacher 25	internet
	slides
	projects
teacher 26	lecture
	experiment
	curricular projects
	activities
teacher 27	discussion
teacher 28	lecture
teacher 29	lecture
	attending volunteer
teacher 29 b	projects
teacher 30	blank
teacher 31	projects
	discussion
teacher 32	experiment
	discussion
	lecture
	activities
teacher 33	lecture
teacher 34	internet

	experiment
teacher 35	group discussion
	internet
	lecture
teacher 36	video/TV
	internet
	lecture
teacher 37	project
	slide
teacher 38	lecture
teacher 39	lecture

Appendix X: Teachers' Responses to Open-ended Questions 16 & 21

Question 16: Which activities do the students conduct at school / at home relating to these issues in Class 8?

Teacher1	project
	excursion
	recycling (classification)
	cleaning around
Teacher 2	recycling project
Teacher 3	environmental awareness campaigns in school
	home experiment assignments
Teacher 4	environmentally related projects
	homework
Teacher 5	outdoor activities cleaning out
	battery collection activity
	planting
	poster preparation
teacher 6	planting
	recycling collecting and separating waste
teacher 7	cleaning the environment
	informing the community with prepared posters
	planting
teacher 8	planting flower
teacher 9	cleaning in and out
	excursion
teacher 10	excursion
	environmental cleaning
	posters to protect environment
	planting
teacher 11	cleaning
	competitions
	video
teacher 12	educational trip
	project
	discussion
teacher 13	planting
	cleaning
	prepare brochures for community
teacher 14	blank
teacher 15	internet search
	group working

	individual working
	debates
	question-answer panels
	competitions
teacher 16	project
teacher 17	collection of recyclable materials
teacher 18	planting
	cleaning
teacher 19	project
	poster preparation
teacher 20	projects
	activate
teacher 21	showing awareness
teacher 21b	blank
teacher 22	poster, picture
	power point presentation
	excursion
	project
teacher 23	project
teacher 24	planting
	cleaning
teacher 25	awarding good projects
	project
	excursion
teacher 26	project
	experiment
	exhibition
teacher 27	blank
teacher 28	project
	exhibition
	poster
	activities
teacher 29	blank
teacher 29 b	activity
teacher 30	planting
	painting
teacher 31	cleaning
	classification of recyclables
teacher 32	celebrating environmental days
teacher 33	blank
teacher 34	video
teacher 35	lecture
teacher 36	poster/drawing
	slide
	excursion

	project
teacher 37	excursion
	project
	drama/play
teacher 38	blank
teacher 39	project
	internet search for info

Question 21: Which activities do the students conduct at school / at home relating to these issues in Class 9?

Teacher 1	flowering around
	planting
	cleaning school ground
Teacher 2	recycling project
Teacher 3	preparing posters leaflets and disturbing around
Teacher 4	blank
Teacher 5	using posters to give message
	recycling projects
	battery recycling
teacher 6	blank
teacher 7	informing the community
	excursion
teacher 8	throwing batteries in battery bins
teacher 9	cleaning
teacher 10	planting
teacher 11	blank
teacher 12	project
	poster
	slide
teacher 13	preparing short film
	planting
	writing poems
	cleaning activities
teacher 14	blank
teacher 15	planting
	cleaning
teacher 16	blank
teacher 17	planting
	protecting environment
teacher 18	one month cleaning and keeping clean activity
teacher 19	project
teacher 20	blank
teacher 21	blank
teacher 21b	increase awareness between students, in community, between children

teacher 22	project
	poster, picture
	power point presentation
teacher 23	projects related to increase awareness of community
	planting
teacher 24	planting
	cleaning
teacher 25	projects
	preparing slides
	preparing posters
teacher 26	experiments
	projects
	field trip
teacher 27	discussion
	planting
	cleaning
teacher 28	project
	exhibition
	poster
	activities
teacher 29	blank
teacher 29 b	TV discussion
teacher 30	educational trip
teacher 31	distribution of leaflets to community increase awareness
teacher 32	trip
	experiment
	internet search
teacher 33	blank
teacher 34	cleaning
	competition
teacher 35	competition
	cleaning
	preparing poster for community awareness
teacher 36	project
	slide
	poster
teacher 37	project
	poster
	slide
teacher 38	group projects
	internet materials
	using computer
teacher 39	info search from internet

Appendix Y: Teachers' Responses to Open-ended Question 23

Sort of In-service Training

Teacher 1	seminar
Teacher 2	blank
Teacher 3	blank
teacher 4	blank
teacher 5	treatment of how to use green pack
teacher 6	blank
teacher 7	blank
teacher 8	REC environment training
teacher 9	blank
teacher 10	blank
teacher 11	green pack training
teacher 12	green pack training
teacher 13	green pack training
teacher 14	blank
teacher 15	environmental education seminar
teacher 16	green pack training
teacher 17	green pack training, water pollution related training
teacher 18	blank
teacher 19	blank
teacher 20	green pack training
teacher 21	blank
teacher 21b	blank
teacher 22	green pack training
teacher 23	blank
teacher 24	training for biodiversity protection
teacher 25	green pack training
teacher 26	green pack training
teacher 27	blank
teacher 28	blank
teacher 29	blank
teacher 29 b	green pack training
teacher 30	green pack training
teacher 31	green pack training
teacher 32	has master on science and environment
teacher 33	blank
teacher 34	green pack training
teacher 35	green pack training
teacher 36	green pack training
teacher 37	green pack training
teacher 38	blank
teacher 39	blank

Appendix Z: Teachers' Responses to Open-ended Question 25

Green Pack Comments

Teacher 1	increase environmental awareness
	increase environmental behavior and attitude
	helping to critical thinking on environmental problems
Teacher 2	blank
Teacher 3	giving rich information about global environmental problems and teach precautions to reduce effect
teacher 4	lack of more actual problems
	lack of statically data
Teacher 5	helps to teachers to teach environmental problems
	there are enough satisfied topics to teach protection of environment
teacher 6	helps to teach environmental issues
teacher 7	has enough info to teach environmental problems
	content is understandable by students
teacher 8	helps to teacher and student about environmental problems
teacher 9	helps to water pollution
	give an idea about environmental problems
teacher 10	blank
teacher 11	give opportunities to discuss environmental problems
teacher 12	give more information about environmental issues
teacher 13	help to protect environment
teacher 14	blank
teacher 15	helps to teach air pollution and deforestation,
	helps to teach environmental issues, this pack should be used as a lesson
teacher 16	should start at class 7
teacher 17	blank
Teacher 18	blank
teacher 19	blank
teacher 20	blank
teacher 21	it is very important for students
teacher 21b	blank
teacher 22	has a lot information about environmental pollution and how to protect environment
teacher 23	gives extra information ,should implemented in curriculum again
teacher 24	blank
teacher 25	gives complementary info to teacher-student regarding environmental problems
teacher 26	blank
teacher 27	blank
teacher 28	blank
teacher 29	blank
teacher 29 b	students environmental knowledge increases
teacher 30	useful a lot has a lot information

teacher 31	it is helpful if find to time to use
teacher 32	blank
teacher 33	blank
teacher 34	helpful in chemistry and biology lessons
teacher 35	has a lot information about environmental pollution and how to protect environment
teacher 36	has extra and supplementary information about environmental problems for teachers and students
teacher 37	includes educational information for teachers and students
teacher 38	blank
teacher 39	blank