UNIVERSITY OF CAPE COAST

THEORY AND PRACTICE IN ENVIRONMENTAL EDUCATION OF TEACHER TRAINEES: A CASE STUDY OF NUSRAT JAHAN AHMADIYYA TEACHER TRAINING COLLEGE.

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature..:..... Date:...13-08-07

Name: Leocadia Zakpala

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature:..... Date:14-08-07

Supervisor's Name: Mr. E. A. Abole.

ABSTRACT

This study was conducted to assess the extent to which the practice of environmental education conforms to the theory and the influence of some background variables (gender, type of senior secondary school (SSS) attended, office held in the college and residential location) on the environmental knowledge and attitudes of teacher trainees in Nusrat Jahan Ahmadiyya (NJA) Teacher Training College, Wa, in the Upper West Region of Ghana. It was a case study conducted using questionnaire and interview as instruments to collect data from a sample of 120 students representing 33% of 2nd and 3rd year Social Studies teacher trainees. All tutors of Social Studies class were also involved as respondents.

The data were analyzed using frequency distribution tables, inferential and descriptive analysis.

The results indicated that Environmental and Social Studies tutors mostly employed discussion and lecture methods for teaching the subject due to financial constraints, inadequate means of transport and large class size. For the same reasons only written tests were used to assess students.

Environmental knowledge and attitude test results showed that male respondents and graduates of boarding SSS had higher environmental knowledge than females and respondents from day SSS respectively, while females, prefects

and graduates of single-sex SSS exhibited more positive environmental attitude than males, non-prefects and graduates of mixed SSS respectively.

Respondents also showed a positive attitude toward Environmental Education as they agreed it equips them with the requisite knowledge for teaching, and creates in them, an awareness about current environmental hazards.

From the findings, the conclusion drawn was that to a large extent, the practice in environmental education conformed to the theory. However, field trips and the practical aspects needed to be taken seriously.

Areas suggested for further studies include extending this study to cover all teacher training colleges in the country and the reasons that account for the observed differences in environmental attitudes between teacher trainees from mixed SSS and those from single-sex SSS.

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DEDICATION

This work is in memory of my parents.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

This section consists of background to the study, statement of the problem and research questions. It also includes the purpose and objectives of the study, significance of the study, limitations and delimitation of the study and definition of terms.

Background of the Study

Environmental issues have been part of contemporary topical issues worldwide. This is because the importance of sustaining a life-supporting environment cannot be over emphasized. As the saying goes: "Don't kill the goose that lays the golden eggs. Deplete your capital, and you move from sustainable to an unsustainable lifestyle. Get too greedy and you'll soon be needy." (Tyler, 1996 p. 7). A sound environment is indeed a critical need for humanity.

Environment has been defined generally as the sum of all the external conditions, which may act upon an organism or community to influence its development or existence (Geddes & Grosset, 2001).

Wright (1974, p. 81) defines the human environment as "the type and population or quantity of the living and non-living things in the human

surroundings together with the surrounding conditions, processes, phenomena, and forces which directly or indirectly, affect the health, well-being and activity of human beings." It implies that the human environmental conditions determine the quality of life, life expectancy, state of health, vitality and productivity of the community. It is therefore imperative that man should show great concern for his environment.

For humanity to realize the need for responsible environmental management, environmental education is required. A definition for environmental education was formulated, as follows:

> Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formation of a code of behaviour about issues concerning environmental quality (Laryea, 1974, p.43).

The National Environmental Education Advisory Council of the United States of America (1996 p. 36) defined environmental education as:

> a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address these challenges and fosters attitudes, motivations and commitments to make informed decisions and take responsible actions.

Put briefly, environmental education is a field of study that creates in participants, an awareness of environmental issues and the problems they pose on human survival and wellbeing. It is also aimed at inculcating in individuals, attitudes that enhance the quality of the environment.

Environmental education has become necessary because of the upsurge of environment related problems such as land, air and water pollutions with their accompanying health hazards, land degradation and deforestation to mention a few. Environmental education is required to curb the unfriendly environmental practices such as bush burning, poor waste management, indiscriminate felling of trees, excessive use of chemicals in crop cultivation and animal rearing. In the absence of environmental education all these problems resulting from human activities, which hitherto were unknown to man, could escalate and pose threats to the balance of ecosystem, to economic development thus resulting in low standards of living and, indeed, a threat to the very existence of man.

Sensing the threats posed by environmental crisis, there has been a great concern about sound environmental management. This has called for the promotion of environmental education worldwide. It is believed that environmental education is the basis for finding solutions to the numerous environmental hazards. A number of United Nations Conferences have acknowledged this fact. Among such conferences are: the Stockholm Conference on the Human Environment, (1972), the Second International Conference on the Environment Future held in Revkjavik (Iceland) in 1977, and the United Nations Conference on Environment and Development (UNCED) summit in Rio de

Janeiro, Brazil, in June, 1992. The reports of UNCED, among other things, focused on reorienting education towards sustainable development, increasing public awareness on environmental issues and promoting training that will equip individuals with knowledge and skills to find solutions to environmental issues (UNCED, 1992).

An International Environmental Education Programme (IEEP) was also launched in 1975 by the United Nations Education, Science and Cultural Organization (UNESCO), aimed at promoting the exchange of information and experiences in the field of environmental education. In line with the IEEP, a series of workshops, symposia, and conferences, focusing on the development of strategies and actions to promote environmental education in all sectors throughout the world have been held, with sponsorship from UNESCO and United Nations Environmental Programme (UNEP). These include the International workshop on Environmental Education held in Belgrade (1975), the Inter-governmental Conference on Environmental Education held at Tbilisi (Republic of Georgia) in October, 1977 (Caldwell, 1990).

In addition to these, Caldwell states that three international conferences on Environmental Education in Developing Countries were organized by the Indian Environmental Society and Development in 1981, 1985, and 1987. Discussions at the various conferences resulted in the formulation of guidelines and policies for environmental education throughout the world.

In conformity with the worldwide trend of promoting environmental education, Ghana has put in place a strategic plan known as the Environmental

Action Plan (EAP) to ensure that all Ghanaians get education on environmental issues. It is believed that the success of any environmental policy is dependent on its ability to reach all sectors of the community. All sectors of the population should be made to understand the formation of the environment and the problems it presents, so as to take sound decisions concerning environmental issues (Environmental Protection Council, 1994).

For the same reason, the Environmental Protection Council (EPC) which was established on 23rd January, 1974, networked with institutions and organizations that are responsible for educating Ghanaians in various forms, in order to reach out to all sectors of the population in terms of environmental education. Representatives of these institutions were involved in drawing up an environmental education strategy at a workshop held at Kokrobite from 19 – 21 October, 1992. These included:

- The Ghana Education Service (GES)
- Department of Community Development
- Non-Governmental Organizations (NGOs)
- The Media, etc. (EPC, 1994).

These institutions and organizations are involved in formal, informal and non-formal environmental education. Outside the school system, the Environmental Protection Agency plays a leading role in promoting environmental education by liasing with the District Environment Management Committees, Employers Associations, Churches, Trade Unions, Chiefs, Non-Governmental Organizations, Youth Clubs, etc. The non-formal education

division (NFED), which is responsible for coordinating the various organizations involved in literacy programmes, has incorporated environmental issues in the functional literacy programmes (EPC. 1994). Within the formal education sector, environmental education is taught right from the primary school, through the Junior Secondary School (JSS), Senior Secondary School, (SSS), Teacher Training College to the Tertiary level of education in Ghana. Environmental studies have been introduced into the curriculum due to the concern of many citizens about the state of the environment (Ministry of Education (MOE) 1990). However, with the exception of the primary school level where the subject is called "Environmental Studies," at the other levels of education, environmental education is only an appendage of 'Social Studies', a core subject studied by all students at the Junior Secondary School (JSS) and Senior Secondary School (SSS), but an alternative to Technical Skills at the Teacher Training College. At the same levels of education, some environmental education topics are taught under Integrated Science, Life Skills, and Agricultural Science.

These are all government's efforts to bring environmental education to the doorsteps of every Ghanaian and all the people living in Ghana because education is the gateway to knowledge and understanding and consequently, the key to social and economic empowerment.

Regarding the status of Social Studies at the three-year teacher training college level, Act 7 of the Environmental Education policy, among other things, gives an outline of training programme for teachers. It advocates the introduction of Environmental Education programmes to train teachers with the view to

increasing the multiplier effect of environmental awareness campaign. Teaching methods of Environmental Education are to be emphasized in all the teacher training colleges in the country (EPC, 1991). Emphasis is placed on environmental education at the teacher training college level for the following reasons:

- It is believed that sound teacher education is vital for the development of any education programme especially in environmental education. Teachers hold the key, at least to that part of environmental education, which takes place in the formal education. (UNESCO, 1977). In other words the successful implementation of the Environmental Action Plan (EAP) designed by the country depends, to a large extent, on the success of environmental education in teacher training colleges. This is because the activities of pupils whom the pre-service teachers are going to teach often contribute to environmental problems such as poor sanitation, bushfires, etc.

- It is also believed that children's views are less dogmatic and less fixed than those of adults; children are more open to persuasion and may therefore be as keen to learn about the environment as teachers are to teach them.

-Most importantly, the children in schools today will, in future, take responsibility for decision-making on environmental issues. It is therefore imperative that they are properly educated to understand the functioning of the environment and to develop healthy attitudes towards the environment. This will be possible only if the teachers themselves are well equipped with the knowledge in environmental issues and if they cultivate responsible environmental habits.

- It is believed that teachers who have the right attitudes and concern for environmental quality will be able to successfully implement environmental education programmes in schools (Mosothwane. 1991).

With this in mind, the Ministry of Education effected an incorporation of some aspects of environmental issues in the Environmental and Social Studies Syllabus for Teacher Training Colleges. The syllabus for Environmental and Social Studies is designed to, among other things, help the teacher trainee to:

- appreciate the need for Environmental and Social Studies as major components of their training;
- acquire knowledge and skills in the subject, which will effect changes in attitudes and values in him/her with a focus on the society and environment.
- acquire skills in teaching Environmental and Social Studies in a logical and sequential manner to effect changes in values and attitudes of their pupils (Ministry of Education, 1999 p. 2).

It should be noted that not many topics on Environmental Studies per say are captured in the TTC syllabus because the teacher-trainees are supposed to have acquired some knowledge and skills of the subject at the basic and SSS levels of education. At the TTC level therefore, the course is intended to strengthen the background subject knowledge upon which the professional education and training are based.

Statement of the Problem

The Environmental and Social Studies syllabus is organized in a way as to give first year TTC students the opportunity to consolidate and improve upon their academic background. The second year is devoted to the basic school curriculum studies, integrated with methodology as well as on-campus teaching practice, while in the third year, students spend one year on an attachment programme on teaching practice in the basic school. Additionally the syllabus spells out the specific learning objectives, teaching learning activities and, in some cases, teaching-learning materials as well as guidelines for assessing the learning outcome of students, also known as the product assessment.

What is absent, however, is a mechanism to evaluate the EE programme. This evaluation is to include the number and calibre of teachers for the subject, the methodology, teaching-learning materials and assessment procedure to determine their appropriateness.

There is the need to find out whether or not there is conformity between the theoretical framework and the practical aspect of environmental education. Thus, the focus of the study is Theory and Practice in Environmental Education (A case study of NJA Teacher Training College).

Purpose of the Study

The study has four main purposes:

i. To assess the theoretical framework as against the practical aspect of environmental education.

ii. To find out the environmental knowledge of students.

iii. To assess the impact of environmental education on the attitudes of students towards environmental management.

iv. To investigate the influence of selected background variables (sex, residential location, SSS attended and offices held in the college) on the environmental knowledge and attitudes of students.

Objectives of the Study

The study strives to find out:

i. The extent to which students have acquired knowledge on environmental issues.

ii. Students' perception about the need for environmental education.

iii. The attitudes students have formed from their knowledge in environmental education.

iv. The relationship between selected background variables of students (sex, sss attended) and their environmental knowledge.

v. The relationship between selected background variables of students (sex, sss attended, office held in college, residential location) and their environmental attitudes.

vi. Whether or not the theory in Environmental Education conforms with the practice in terms of teacher-student ratio, teacher qualification and experiences, teaching methods, teaching-learning materials and the forms of assessment employed by Environmental Education teachers.

Research Questions

The study addresses the following research questions:

1. How much knowledge have students acquired on environmental issues?
2. What is the relationship between selected background variables (sex, senior secondary school attended) and the environmental knowledge of students?
3. Do students realize the need for environmental education?
4. What attitudes have students formed about environmental management?
5. What is the relationship between selected background variables (sex, residential location, senior secondary school attended, office held in the college), and the environmental attitudes of students?
6. Does the theory in Environmental Education conform with the practice in terms of teacher-student ratio, qualification and experiences of teachers, and the teaching methods, forms of assessment, as well as teaching-learning materials employed by Environmental Education teachers?

Significance of the Study

Findings of the study will add to the body of knowledge on environmental related issues as it will bring out alternative ways besides the current ways of inculcating into students, sound environmental management habits.

The results of the study may serve as a feedback to curriculum developers, teachers and policy-makers regarding the effectiveness of environmental education. It will thus prompt curriculum developers to design environmental education programmes that are not merely limited to promoting environmental

knowledge and understanding, but to include elements that will tend to lead to the development of citizens who are capable of resolving environmental problems.

The outcome of this study will lead to a favourable response to the campaign for discipline, with particular reference to sound environmental management in Ghana. If teacher trainees are well equipped with the knowledge, attitudes, commitment and motivation to take responsible environmental decisions and if they have the skills to impart such qualities to the pupils they are being trained to teach, the result will be an increase in the multiplier effect in the environmental awareness campaign, as envisaged in Act 7 of the EE policy. This will have both long-term and short-term effects. In the short-term, pupils may not only take environmentally friendly decisions and actions, but may influence their friends, colleagues and relations to do likewise. For the long-term effect, these pupils will grow up to become the future leaders of the country and decisions, including those concerning the environment will be entrusted to them. The kind of environmental decisions they will take in the future will be a reflection of the sort of EE they receive now. If pupils are given the best kind of EE, which is the ultimate goal of this study, they will take the best environmental decisions in the future.

Additionally, this study will serve as a mouthpiece of environmental educationists to alert government to the need to allocate sufficient funds for effective EE programmes in the country.

Limitations of the Study

Since the data were gathered by means of questionnaire the problem of respondents' bias, normally associated with research based on the use of this instrument cannot be ruled out.

The multiple choice questions that are used to gather information from respondents, though very objective and less time consuming, does not constitute the best method of establishing environmental attitudes of respondents. If there were ample time the researcher could have combined it with observation of the environmental management of respondents.

Delimitation / Scope of the Study

The study is restricted to only the Environmental and Social Studies teachers and students in NJA Teacher Training College, Wa, in the Upper West Region of Ghana. The conclusion and generalization would, therefore, not be applicable to all training colleges.

Definition of Terms

For the purpose of this study, the following definitions are applied for words, concepts and expressions:

1. Environment: The physical surrounding in which humanity struggles to survive and thrive (Gilpin, 1986). It also refers to, the sum of all the external conditions which may act upon an organism or community to influence its development or existence (Geddes & Grosset 2001).

2. Environmental Conservation: The measures to protect and enhance productivity of the biosphere. It includes measures to safeguard the living resources of the biosphere and their habitats (UNEP, 1982).
3. Environmentally Responsible: Actions that tend to lead to the preservation and restoration of human and ecological harmony.
4. Environmental Protection: All interventions that may be deemed necessary to maintain a high level of environmental quality and which at the same time, enhance sustainable socio-economic development (EPC, 1994).
5. Teacher Trainee/Pre-service Teacher: A student pursuing a professional Teacher Training Programme.
6. Environmental Studies (ES): In this content refers to Environmental and Social Studies.

CHAPTER TWO

LITERATURE REVIEW

Introduction

Environmental issues have been of global concern for well over thirty years now. Some major environmental problems have been identified and investigated into, but very little has so far been done in the area of comparison or evaluation of the theoretical framework as against the practical aspect of Environmental Education (EE). This study therefore had to fall on literature that is related to the problem under consideration. For the purpose of the study the review of literature is broken down into sub-headings namely:

- Concepts and theories of EE.
- Need for EE (Health, sanitation and maintaining balance of ecosystem)
- General Environmental Problems in Ghana. (Types/forms and causes)
- Environmental Education in Ghana
    i. Formal (Basic School, SSS and Teacher Training College levels).
    ii. Informal.
- Knowledge outcomes of EE.
- Attitude outcomes of EE.
- Influence of selected background variables on environmental attitudes.
- Summary of literature review.

Concepts and Theories of Environmental Education

Environmental Education as a concept has been interpreted differently by different people. The National Environmental Education Advisory Council (1996, p.3) defined the field as:

> a learning process that increases people's knowledge and awareness about the environment and associate challenges, develops the necessary skills and expertise to address these challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.

This definition contains three essential elements which are also contained in the founding documents of the field; the Belgrade Charter, 1976 and the Tbilisi Declaration 1977. The essential elements are:

- Knowledge and awareness,
- Personal attitudes and commitments and
- Skills to take responsible action.

Similarly the UNESCO (1997) definition of environmental education had three main elements, which are similar to those in the NEEAC definition, but are more comprehensive than the latter. They are:

i) to foster a clear awareness of and concern about economic, social, political and ecological interdependencies in urban and rural areas;

ii) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitments and skills needed to protect and improve the environment.

iii) to create new patterns of behaviour of individuals, groups and society as a whole towards the environment (Filho, 1996 quoted in Gray-Donald, 2001).

In a process-based EE such as the Action Research (AR) or Community Problem Solving (CPS) approach, EE is defined as the process that enables learners and teachers to participate fully in the planning, implementing and evaluating of educational activities, aimed at resolving an environmental issue that has been identified by the learner. (Wals, 1994, p. 163). In this approach the learner determines to a large extent, the content and direction of the learning process, while the educator is more concerned with the quality of the learning process. The perceptions and experiences of the learner thus determine what the environmental issue is and the teacher becomes a co-learner and a facilitator.

Wals and Van der Leij (1997) suggest that EE should focus more on the quality of the learning process and less on its content since people and communities are often faced with different and sometimes unique environmental problems. Environmental education should therefore be relevant to people and communities by helping them understand themselves, their community and their relationship with the natural environment. They view EE as a learning process with four dimensions; it seeks to enable participants to construct, transform, critique and emancipate their world in an existential way. This means that, EE is to build on the knowledge and experiences of the learner. It is also to critically examine the values, assumptions, views and morals of the society in which the learner lives. Impediments to communication and change should be removed. Finally, EE is to effect a positive change towards the environment.

In addition to these, are four concepts presented by New Zealand, which have reflected in the New Zealand Resource Management Act 1991 and the Environmental 2010 Strategy. They are the concepts of Interdependence, Sustainability, Biodiversity and Personal and Social responsibility for action. (Ministry for the Environment and the New Zealand Local Government Association, 2001).

Concept of Interdependent

Fien and Gough (1996) stated that a useful way of viewing the environment is recognizing it as a set of interrelated system of biophysical, social, economic and political systems. They further explain that the biophysical system provides life-support system for all life, the social system provides rules and structures that enable people to live together, the economic system provides ways of producing goods and services, while the political system guides people to make decisions about how social and economic systems use the biophysical environment. This shows that the human environment is not restricted to the physical environment only.

Concept of Sustainability

The concept of sustainability is seen as a link to the concept of sustainable resource management, which deals with both renewable and non-renewable resources. Our lifestyle choices as well as personal and social values influence the use of resources. The way resources are managed can affect the quality of the environment. Ensuring sustainability of finite resources means relying on people who are ecologically literate, to examine ways to reduce the effects of economic

development on natural resources. The same concept is asserted in Filho (1996) which states that there is a close link between EE and a country's ability to reach the ultimate goal of sustainable development. It is claimed that if the citizens of a country are more environmentally conscious, then resources would be more efficiently used and less would be wasted. It is further stated that individuals and communities would become largely self-reliant, relying upon the internal cycling of materials and placing minimal burdens on the local and outside environments. Filho again asserts that in order to create local capacity it is essential to be able to analyze and deal with resource use issues (Filho, 1996 cited in Gray-Donald, 2001).

The Concept of Biodiversity

This is the variety of all lives on earth; these include plants, animals and micro-organisms, which form the ecosystem. Biodiversity envisages the impact of the activities of people on the living system. Human activities have reduced the diversity of life by modifying many natural environments and exploiting plants and animals. Environmental Education is thus a tool for protecting the indigenous habitats of species.

The Concept of Personal and Social Responsibility and Action

Regarding this concept, it is believed that the quality of the environment depends on the everyday actions of individuals. In other words, the quality of the environment depends to a large extent, on people taking positive action to help resolve environmental problems. Environmental education programmes should therefore provide opportunities for students to apply their knowledge and skills as

they decide the actions to take on a range of environmental issues and problems. As Darlene (1997) rightly put it, new environmental education models go beyond the mere creating of awareness and understanding to include building skills, a sense of commitment and responsibility and ultimately, to stimulate individual and collective action. Such programmes link environment concerns to social issues and bring about social transformation.

A study conducted by Hungerford and Volk (1990) on the effectiveness of EE for promoting responsible citizenship behaviour revealed a similar idea. Hungerford and Volk assert that the changing environmental behaviour is much more complex than the traditional model of knowledge acquisition, change in awareness and attitudes. They argue that there are many other factors that influence the degree to which environmental knowledge is translated into action, two of the most crucial factors being, having an internal locus of control and having acquired action skills and action strategies. They further explain an internal locus of control to mean being self-reinforcing with respect to a goal such that one continues to strive to achieve a distant goal. Having action skills comes from involvement in previous action, often with the aid of an instructor. The authors also noted that EE programmes with a focus on a single and most often local environmental issue do not expose students to the ability to generalize their actions to other issues or the environment in general. Hungerford and Volk further observed from their studies that one of the greatest predictors of environmental action is the feeling of empathy or environmental sensitivity rather than knowledge.

Closely related to Hungerford and Volk's (1990) findings is the Action Competence Approach in Environmental Education by Jensen and Schnack (1997), who argue that environmental issues should not be concerned with only quantitative changes in issues of resources, but also qualitative changes regarding alternate visions of personal and societal development. Environmental education should not be focused on changing specific behaviours but also to initiate a conscious change of an individual's values to enable him/her recognize new environmental insights. Rather than producing explicit behaviour modification, environmental action competence should be a deeper questioning of an individual's relation to the environment and community. Environmental action competence should be based on a willing and able participant who is aware of the scientific, social and economic rationale for their actions.

Theories of Environmental Education

Like the concepts, the theories of EE are equally varied. For the purpose of this study, a few of them will be mentioned. While some EE theory proponents place emphasis on the content and the way EE is presented to students, using hierarchical levels of universal goals and objectives (Hungerford, Peyton and Wilke (1980); Hines, Hungerford and Tomera (1986/87); Marcinkowski (1993), others such as Robottom (1987); Wals (1994); Stapp and Stankorb (1996), who question the value or the status of universal goals and objectives, put emphasis on 0the contextual development of EE within the school community.

Presuppositions Regarding Environmental Education

There are also several presuppositions or biases regarding EE, some of which are the following:

1) The presupposition that EE can lead to an educational reform that ultimately can help reshape relationships between people, and between people and their environment. In this case, EE is viewed as a process that can lead to educational change. This is in contrast to the view of the behaviourist who holds that EE is an instrument that can modify behaviour in a "pre-and-expert determined" direction.

The predominant approach to EE is an example of the behaviouristic approach. This approach has the tendency to reduce students and teachers to manipulable objects (Robottom and Hart, 1995). A clear example of this argument is shown in the statement of Monroe (1988, p. 4): "If environmental educators have done their job, we should see environmental education curricula clearly promoting a non-anthropocentric ethic and indoctrinating youth in it". A similar view is expressed by Hungerford and Volk (1990, p. 18) who stated that ".....responsible citizenship behaviour can be developed through environmental education; the strategies are known and the tools are available".

2) The second presupposition is that EE should lead to the development of autonomous thinking about issues that affect the quality of life of mankind and other species. This indicates that prescribing a behavioural outcome that the learning activity or sequence of activities should foster is not appropriate (Jickling, 1992). Instead, EE that is focused on human development rather than

human behaviour could contribute to the formation of a new insight for re-examining our lifestyles, power relationships, connection with the natural environment and connection with other people in order to develop alternative pathways for living (Wals and Van der Leij, 1997).

3) The third presupposition is that the planet earth is facing destruction as a result of symptomatic environmental problems such as overpopulation, deforestation, excessive and hazardous waste and the degradation of water, air and soil. These problems, it is believed, are rooted in the unequal distribution of wealth, the uncontrolled striving for economic growth and inadequate education. Included here are the ideas that there are limits to growth and that resources and human resources development should be distributed in a more equitable manner.

4) The fourth presupposition is that good EE enhances critical thoughts towards the world and towards oneself by promoting discourse, debate and reflection. Through discourse, participants engage in a process of self-reflection on the relationship between their own guiding assumptions and interpretations and those of others. The process of value clarification comes to play, and since values cannot be imposed either ethically or pedagogically, EE is to provide situations in which all participants feel free to discuss and make their value explicit.

In the view of Habermas (1991), achievement of the necessary communication competence requires equal participation in discussion that is undistorted by power relationships, and also an unlimited scope for radical questioning of social structures and procedures. This forms the basis for Habermas' theory of morality.

Democracy Approach

Another EE theory of significance is that of the Democracy approach that was started in Denmark, and which reflects the main idea behind the EE project in Denmark called the Jaegerspris Project (Jensen, Kofoed, Uhrenholdt and Vognsen, 1995). According to this approach, an important task of the school is to educate for and with democracy in order to develop action competent citizens who are able to contribute to the democratic society. It is believed that environmental problems can only be solved if democracy is strengthened at every level, therefore the development of EE should be school-based and context-specific.

Kara Chan's Theory of Attitude

This considers perceived behavioural control, perceived degree of difficulty and perceived level of subjective norm as predictors of actual behaviour very important in environmental education. The results of a study of recycling habits carried out in Hong Kong by Chan showed that the attitude of an individual was the most significant factor in predicting their actual behaviour. Thus the best predictor of a person's recycling behaviour is having a positive attitude towards recycling. The second predictor, according to Chan, is the perceived behavioural control or the perceived degree of difficulty in completing the behaviour. If a person perceives an environment related task as very difficult he/she will have a negative attitude towards the task. The third predictor, the perceived level of subjective norm, refers to the reward or punishment that will be attached to the performance of a task. In other words, how strongly will performing unsound

environmental behaviour be punished by other social actors, or how strongly will proper environmental behaviour be rewarded by social actors, or by one's own self-image and belief in being a good citizen? (Chan, 1998).

Theories of Attitude Acquisition

Having talked about attitudinal change in environmental education it is worthwhile mentioning some of the theories of attitude acquisition and change. Hull (1943) and Tolman (1932) used the principles of learning theory to explain attitude acquisition and change. Most learning theories are concerned with how evaluative responses become associated with given stimulus objects. One of these theories was applied by Doob (1947). He viewed attitude as an observable response to an object that occurred before or in the absence of any overt response. Doob emphasised that, a person first learns an implicit response to a given stimulus, then must learn to make the specific overt responses to that stimulus. The first process (response to a given stimulus) can be accounted for by classical conditioning, and the second process (overt response to an object) can be accounted for by instrumental learning. According to Doob, both processes constitute the attitude. He argues that attitude should be differentiated from other types of responses that are elicited by relevant stimuli that are socially significant to a person.

The Reinforcement Theory of Attitude Change

This theory has its contributors as Hovland, Janis and Kelly (1953) and other researchers at Yale. Their theory is based on the initial learning theories of Hull (1943). The reinforcement theory states that attitudes change results from

learning through reinforcement. In the view of the authors, both opinion and attitude are regarded as intervening variables, of which there is high degree of association and interaction. By this theory the most important interaction is the change in attitude following a change in opinions, attention, comprehension and acceptance. Before any persuasion can take place, the individual must be attentive to the communication. Secondly, he/she must understand and comprehend its content. Finally, for communication to be accepted there must be significant incentives. One of the assertions of this theory is that opinion change usually precedes attitude change. Applied to EE, it implies that the discipline should first of all aim at changing the opinions, values and attitudes of participants, which will ultimately lead to a change in their behaviour.

The Need for Environmental Education

In the year 1988, the government of Ghana initiated the preparation of an Environmental Action Plan (EAP) to purpose a strategy to address the key issues, which include deforestation, deterioration of soil quality and better management of renewable and non-renewable natural resources. The action plan provided a framework for interventions deemed necessary to safeguard the environment. Environmental Education (EE) formed a major part of EAP since it was presupposed that education would make all sectors of the population understand the functioning of the environment and the problems associated with it, and contribute to its protection and improvement (EPC, 1988).

Danquah (1997) stated that the creation of public environmental awareness needs more emphasis, because a good section of the populace continues to abuse the environment out of ignorance.

Bennet (1977) also views EE as a necessity because of the recognition of the need for environmental quality, the need for motivated, informed and active people to work for environmental quality, and the need to help people acquire strong feelings fundamental to developing a concern for the environment and a motivation to participate in activities for maintaining and improving the quality of the environment.

Similarly, at the 1981 UNESCO environment conference, it was agreed that EE is an unavoidable concomitant of education because it contributes to the long-term well being and survival of mankind. Wright (1974) expressed a similar view when he stated that the human environmental conditions determine the quality of life, the living standards, and life expectancy, state of health and vitality as well as productivity in the community. It is therefore justifiable and desirable that human beings should know about the environment.

> Gray-Donald (2001, p. 4) summed up the need for EE when he stated that some environments bring out the best in people, many do not. This constitutes a puzzle that takes many directions including:
>
> - the importance of the natural environment.
> - ways to make environments both understandable and interesting.
> - approaches to meaningful participation in environmental decision-making.

- exploration of ways to conceptualize and assess effectiveness in well-being.

These all boil down to the fact that ignorance about environmental issues promotes environmental abuse resulting in many unpleasant consequences. The consequences of irresponsible environmental management are many, but three major ones shall be discussed in this research. These are, bio-diversity reduction, poor sanitation and poor health.

Reduction in Bio-diversity: Looking at the rate at which natural resources are being destroyed, Hayward (1977) suggested that there is the need for conservation and preservation in order to protect the biological resources, which contribute immensely to the stability and productivity of the planet (earth). Similarly there is the need to protect the non-renewable mineral resources. The only real hope lies in the realm of education and good moral environment and ecological expertise.

De Blij (1993) observed that wanton destruction and exploitation of the environment continues to threaten the entire earth's biodiversity. He cited examples of such activities as the deliberate spilling of oil and setting on fire by Iraqis during the 1991 conflict over Kuwait and the mercury poisoning of Amazonian streams by Brazillian gold miners.

Acid rain which results from the release of sulfur dioxide and nitrogen oxides into the atmosphere when fossil fuels (coal, oil and natural gas) are burnt does, over time, have an adverse impact on biodiversity. There is evidence that the deposition of acid from acid rains is causing lakes and streams to acidify,

resulting in the death of fishes, stunted forest growth and the death of acid-sensitive crops (De Blij, 1993). De Blij further attributed some environmental conditions such as desertification and deforestation to man's activities. He said the southward march of the Sahara desert is partly due to overgrazing, woodcutting, soil exhaustion and other environmental misuse. Similarly, deforestation is attributed to crop farming activities, human settlement, construction of infrastructure, woodcutting and logging. In the early 1980s, the Food and Agricultural Organization (FAO) of the United Nations undertook a study on the rate of depletion of the equatorial and tropical forest and it was revealed that 44 percent of the tropical rain forest had already been affected by cutting and 1 per cent was being logged every year. The destruction of the forest habitats results in a continuous loss of species of plants and animals.

Dumping of hazardous waste into the sea, oceans and rivers constitutes another threat to biodiversity, so is offshore mining activities. In Thailand, it has been discovered that off shore tin mining has degraded sea water quality and damaged reef ecosystems (Ruyabhorn and Phantumvanit, 1988).

On his part, Adomah (2001), observed that bush fire is one of the causes of environmental degradation, especially in the hinterlands of Ghana. Bush fire does not only impoverish the soil and pollutes the air but also is a contributory factor to the extinction of some species.

Environmental education is therefore necessary to check or minimize environmentally unfriendly activities that threaten the conservation of biodiversity. According to Haeuber (2002), biodiversity is important because it

provides the linkages that hold natural systems together. For example, fisheries will die out without marine diversity that keeps marine food chain intact. Haeuber asserts that Fisheries are already a source of competition and tension among nations, and further degradation will intensify the tension. Thus, biodiversity is essential to hold both natural and human systems together. Environmental education serves as an eye-opener in this direction.

Poor Sanitation: The term 'sanitation' has been interpreted in various ways by different people. The World Summit for children, which sets the goals for child survival, development and protection, identified access to sanitary means of excreta disposal as a basis to measure progress in sanitation (UNICEF, 1992). The Rio Conference on its part considered sanitation to be part of broader environmental issues such as air pollution, water pollution, land degradation, etc. (UNICEF, 1992).

Until recently, policies of many countries have focused on access to latrines by households as a generic indicator of sanitation coverage, but of late there has been a shift and an expansion in conceptualizing the term sanitation. The Working Group of Sanitation Promotion of the Collaborative Council for Drinking Water Supply and Sanitation, considered sanitation as encompassing all behaviours and practices acting to block the transmission of faecal diseases (WHO, 1994). Water supply and sanitation projects have integrated health education programme to induce changes in health-related behaviour to prevent diseases, and some of such projects have led to behavioural change in the target groups in Burkina Faso (Curtis et al., 2001). These recent efforts to redefine the

basic concept results from a general dissatisfaction with the definition of past decades which considered sanitation as access to excreta disposal facility alone.

One of the new definitions of sanitation was given by Tenkorang (2002), which states that sanitation involves access to waste disposal systems, their regular, consistent and hygienic use, and the adoption of other hygienic behavioural practices that block the transmission of diseases.

In addition, the World Health Organization (WHO) considers proper disposal of hazardous and non-hazardous waste, and waste management as crucial to sanitation, so is sewage sludge (UNEP, 1993). Thus, the working group of sanitation promotion considers a successful sanitation programme as one that improves health, is sustainable at community and institutional levels, is cost effective and increases coverage levels (Perez, 1994).

In order to reduce transmission of faecal-oral diseases, an expert group of epidemiologists and water supply and sanitation specialists concluded that three interventions would be crucial. These are:

- Safer disposal of human excreta, particularly that of babies and people with diarrhoea.
- Hand washing after defecation and handling of babies' faeces, and before feeding, eating and preparing food.
- Maintaining drinking water free from faecal contamination in the home and at the source (WHO, 1993).

Noye-Nortey (1974) stated that sanitation as a determinant of healthful environment is itself partially dependent upon other determinants such as physical

planning, housing quality and infrastructural developments. The provision of the basic infrastructures of water supply, sewerage and drainage provides the foundation for good sanitation. Thus, poorly planned communities are characterized by poor sanitation.

In conclusion, the availability of a combined advantage of infrastructural development and good management of the sanitation services as well as hygienic practices can ensure high quality environment. An awareness of this can be created through environmental education.

Poor Health: Ramlogan (1997, p. 1) observed that:

> the threat to human health from environmental factors is not an isolated problem that exists on a national level. There are environmental factors that affect human health on a global level or are so widespread as to be considered global problems. Other environmental problems cross national boundaries and achieve regional importance.

This calls for a global environmental education, as good health is the bedrock of every aspect of human development and advancement in life.

The World Health Organization (WHO) defines health as the state of complete physical, mental and social wellbeing of a person or mankind; not merely freedom from disease or infirmity (Wiesner, 1992).

There are many consequences of environmental degradation in the global community, but one of the principal concerns lies in the area of human health because, as Ramlogan (1997, p. 2) rightly puts it, "...as the conflict between man

and the environment intensifies, it would be wise to bear in mind that the human body may pay the ultimatc price for the indiscretions of the human race".

The impact of environmental degradation on human health are of different dimensions: these include those of global, regional connections, and national, dimensions. In addition are those that have indirect consequences on human health.

Environmental degradations that have worldwide health consequences: These include global warming, depletion of the stratospheric ozone layer, marine pollution, chemical pollution and nuclear pollutions.

Regarding the impact of global warming, it is believed that a climatic change is destined to affect the entire global village since it is a planetary occurrence. As a result of the effects of Greenhouse emissions, a warmer world is forecast to be experienced sooner or later. It is thought that human health may be affected by global warming in the sense that under warmer conditions, heat stress related conditions may become prevalent leading to increases in morbidity and mortality. For instance such a condition may lead to higher infant and foetal mortality, skin infections and insect-born diseases like malaria (Longstreth, 1990).

Depletion of the stratospheric ozone layer has a direct impact on human health. Morison (1992) asserts that exposure to ultraviolet-B radiation can cause a suppression in immune systems leading to an increase in infections. In addition, there may be a possible decrease in the effectiveness of vaccines (UNEP, 1990). Skin pigmentation would not protect against deficiencies in the immune system, thus rendering persons in the tropics equally at risk as their white counterparts

(Ilyas, 1989; Jeevan and Kripke, 1993). High levels of ultraviolet – B can lead to increased damage to the eyes as well, resulting in higher incidences of cataracts, which impair vision and even cause blindness. The long-term effect is skin cancer (UNEP, 1990).

Marine Pollution is another form of environmental degradation that has resulted from the high level of population in the vicinity of oceans that has led to the direct dumping of both liquid and solid wastes at sea. Also man's use of the ocean has led to pollution from within the ocean. It is estimated that approximately 6.4 million tons of general shipboard litter are dumped annually by ships at sea (Tolba and El-Kholy, 1993). Additionally, hydrocarbons, radioactive waste, hazardous and non-hazardous wastes are all dumped into the sea, as this ecosystem is considered a dump of last resort. Fish contamination by these waste substances can have serious health implications. The consumption of contaminated sea food can lead to serious health problems, particularly in developing countries where the oceans provide the major source of protein (White, 1993).

Chemical Pollution has been a problem for many centuries. From time immemorial man has engaged in the use of chemical for various purposes including those used on our bodies, food, water, etc. Among the chemicals in use, pesticides are the most widespread and infamous source of chemical contamination, which exists in the atmosphere, water, soil and food. Pesticides are used for the controlling of pests, enhancement of crops, destruction of disease-causing insects and improvement of household conditions by eradicating those

living organisms that cause discomfort in dwelling places (McEwen and Stephenson, 1979). The horrors of indiscriminate use of pesticides were unearthed through the publication of the famous "Silent Spring" by Carson (1991).

The adverse effects of chemicals on human health is also of great concern as chemicals can enter the organs of living things through air, water and food, which are unavoidable. Health problems resulting from chemicals may include local irritation, cancer and reproductive problems (Blain, 1990).

Even though nuclear operations are national issues they have global implications. The threat to human health arising from the use of nuclear technology is the possibility of exposure to radiation. This may lead to damage of cells in the body. High levels of radiation lead to both somatic and genetic changes in living organisms. Somatic effects are those resulting directly from the radiation dose received by the affected cells, and manifest themselves in some form of radiation-induced malignancy. The effects include increased incidence of leukaemia and other types of cancers, as well as abnormalities in offsprings of the affected individuals (Glasstone and Jordan, 1980).

Environmental Degradation with Regional Consequences: Issues under this are desertification and problems associated with fresh water.

One of the alarming features in recent times has been the growing desertification of several regions in the developing world, especially the sub-Saharan region. This, in addition to the loss of biological diversity and human suffering may have health consequences as well. Crop failure and lack of

livestock often lead to malnutrition in the human beings, which makes the body weak and prone to a lot of diseases. Eye diseases such as trachoma and other infections like bilharzias may be more prominent under conditions of desertification (Secretariat of the United Nations Conference on Desertification, 1977).

As a result of environmental degradation potable water has become scarce in most developing countries. The failure to get water of sufficient quality for domestic usage has tremendous health implications. It may lead to the spread of infectious diseases which account for 72 per cent of deaths of all children under five years old and 45 per cent of overall deaths (UNEP, 1993).

Environmental Degradation with National Consequences: Degradation of this nature includes indoor air pollution, outdoor air pollution, hazardous waste, non-hazardous waste, noise pollution and light pollution.

Indoor Air Pollution is caused by biomass and non-biomass combustion. Non-biomass combustion normally pertains to the use of gas ranges, which have no gas exhaust system for cooking. This allows the gaseous product of combustion to enter the indoor air directly during use (Greim, 1989). The two major emissions during the combustion are carbon monoxide and nitrogen dioxide. Water heaters and gas or coal heaters are also indoor sources of carbon monoxide, which produces toxic effects in the human body. These can cause flu-like symptoms at low level and may lead to coma and death at higher levels (Lambert and Samet, 1994).

Biomass fuels are generated from sources such as charcoal, sawdust, wood, dung, straw, agricultural waste and vegetable matter. Burning biomass for fuel results in the production of particulates, carbon monoxide, nitrogen dioxide, sulphur dioxide, etc. In this area, the developing world appears most vulnerable (Gold, 1992). In developing countries, it has been shown that the incidence of lung cancer rises as a result of exposure to particulates and gaseous emissions arising from burning of biomass fuel in poorly ventilated houses (Gold, 1992). Studies conducted in China and Zimbabwe revealed that lung diseases were prevalent in homes where wood is used as fuel.

The story is not different in Ghana. A study in Ghana has shown that there are adverse health effects on women and young children arising from the burning of biomass fuel used for cooking (McGranahan and Songsore, 1994).

There are different forms of outdoor air pollution but the most common ones are the Suspended Particulate Matter (SPM) and Oxides of Nitrates. The SPM refers to a wide range of finely divided solids and liquids dispersed into the atmosphere. These may result from natural sources, industrial activities and combustion processes. The effects of SPMs on the environment are highly influenced by sulphur-based emissions. The health impact of high levels of such emission includes high incidence of asthma, bronchitis and pulmonary emphysema (Elsom, 1992).

Oxides of nitrogen, which are also dangerous sources of air pollution, are from the combustion of fossil fuels in fixed sources like power plants and in motor cars from the internal combustion engines. At high levels of exposure to

nitrous fumes it may cause coughing, headaches and chest tightness. It may lead to sudden circulatory collapse and water accumulation in the lungs. Excess blood nitrate may reduce blood pressure, which in turn could cause destruction of blood cells, liver and kidney defects (Wellburn, 1988).

The onset of industrialization has led to the production of many types of hazardous waste. The improper disposal of this waste poses a threat to health. The landfill gases and other hazardous materials are carcinogenic or neurotoxin and people who work at the disposal sites as well as those who scavenge for a living may be at serious health risk. Careless disposal of this waste may affect flora and fauna, thus contaminating them. Sensitive species may die, and humans who consume affected plants may also become infected. Leaching of hazardous waste into sources of drinking water may equally be dangerous to human health (Logan, 1991).

Non-Hazardous Waste comprises mostly, refuse from households. It can be a significant health threat if not dealt with properly. The WHO has stated that uncollected refuse in developing countries is a major factor of gastrointestinal and parasitic diseases, mainly as a result of the proliferation of insect and rodent vectors (UNEP, 1993). Dumping of waste near human settlements can increase the risk of poisoning and other health hazards to nearby dwellers and people who scavenge at dump sites.

Insufficiently treated and untreated sewage sludge that is dumped near sources of drinking water, used as fertilizers for crops or dumped as raw sewage

in trash heaps or course of water gives rise to a host of diseases that have adverse effect on the health of man (World Bank, 1992; UNDP, 1994).

Noise Pollution in recent times, arises from heavy machinery at work complexes, transport vehicles, home appliances, aircrafts, religious activities and leisure activities. The impact of noise on man may be auditory or non-auditory. On the auditory level, noise pollution can damage or destroy the microscopic hair cells that transmit sound to the brain, leading to either temporary or permanent damage (Faruqui, 1985).

The non-auditory impact of noise pollution is varied. Noise can lead to changes in blood pressure, heart rate, cardiac output and pulse volume. A study conducted among factory workers in noisy environments in the Federal Republic of Germany showed a higher susceptibility to cardiovascular disease than among workers in less noisy environments (Faruqui, 1985).

Noise can also create both neurological and psychological effects on the central nervous system. A study in London revealed a higher rate of mental illness among people living in noisy neighbourhoods. Noise can also affect man's vision and balance, cause dizziness and impair one's ability to select relevant from irrelevant visual information (Faruqui, 1985). Additionally high noise level interferes sleep, creates stress and can lead to the development of feelings of annoyance, frustration, intolerance and moodiness. Stress resulting from noise may impact adversely on the psychological well being of an individual (Cunniff, 1977).

Light Pollution is another problem that has resulted from man's technological advancement. With the rise of artificial lighting, there has been an increase in the daily exposure to light. It is generally accepted that the synthesis of melatonin, a significant pineal hormone, takes place in darkness. Its production diminishes in light. With the presence of artificial light that prolongs the exposure of many bodies to light, the production time for melatonin from pineal is reduced. This reduction has consequently decreased the oncostatic effects of melatonin, leading to an increase in the incidence of tumours particularly among the younger age group (Kerenyi, Pandula and Feuer, 1990). It has also been asserted that light pollution can affect a person's sleeping ability leading to increased stress (Neale, 1995).

Environmental Degradation that has Indirect Consequences: Two features that play important roles in environmental issues and which are being abused by man resulting in an impact on health are Wetlands and biological diversity.

Wetlands have always played an important role in human society from time immemorial to date. Wetlands are important for their role in performing certain chemical functions with respect to the decontamination of water. Wetlands trap water and filter out pollutants, especially nitrogen and phosphorus which are by-products of the explosion in the use of fertilizers (Holmstrom, 1995). The removal of these by-products from freshwater and marine ecosystems helps to reduce their harmful effects on species there. In addition, toxic residues such as heavy metals, pesticides, and herbicides are also removed by wetlands

from water. Wetlands are also efficient in their ability to process human and animal waste materials. For example, it has been found that in Wisconsin, about 86.2 percent of the coliform bacteria present in domestic sewage is removed by the Brillion marsh (Williams, 1993). A destruction of these wetlands by man can therefore have adverse effect on health.

Biological Diversity is another area where environmental degradation can indirectly affect human's health. One of its major benefits is the role it plays in furnishing man with medicinal products. Both the indigenous and modern man has to a great extent, depended on nature for the cure of many ailments. Natural products have been used for the production of life-saving medicines such as penicillin, quinine, and others (McMichael, 1993). It is stated that between the period 1959 – 1973, more than 25 per cent of all prescription drugs were plant-based (World Conservation Monitoring Centre, 1992). The WHO has also claimed that three-quarters of the worldwide primary health-care needs are met by traditional medicines, which are obtained from plants and animals. Ninety per cent of health needs in developing countries are met by traditional medicine (McMichael, 1993). In 1988, it was estimated that there were approximately 119 chemical substances extracted from about 90 species of higher plants that were being used in medicines throughout the world (Farnsworth, 1988). It is also alleged that products of some plants in the tropical forests are showing positive signs in the fight against cancer cells (McMichael, 1993). Similarly, an important drug used for the treatment of childhood leukaemia is manufactured from a plant called Vinca rosea (Rubin and Fish, 1994).

Animals are also proving useful in the development of medical products. The frog population for example, contains several chemicals that are quite promising in the development of medicine (McMichael, 1993).

These are evidences that show that through biological diversity nature has provided man with an extensively stocked pharmacy to repair broken bodies and minds. Therefore destroying the world biological diversity without fully understanding the properties of the species lost is a threat to human health and existence. Therefore there is the need for EE.

General Environmental Problems in Ghana

The major environmental problems in Ghana arise from environmental degradation. Dregne states that an environment becomes degraded when it loses its capacity to perform the primary functions of providing food, shelter and raw materials for domestic and industrial purposes (Dregne, 1983). The United Nations Environmental Programme (UNEP, 1977) also explains that in a typically degraded environment, the air and water bodies are polluted, soils lose their fertility and are eroded, vegetation diminishes, reproduction of biomass is lowered and diversity of ecosystem is reduced.

There are different forms and different causes of environmental degradation some of which will be discussed in this write - up.

Types of Environmental Degradation

Rawlings (1995) enumerated the principal environmental problems to include pollution, soil and coastal erosion, insufficient waste management and deforestation.

Similarly, Noye-Nortey (1974) stated that the critical problems of the urban environment in Ghana include pollution and contamination of the immediate human residential environment, or the neighbourhood; poor management of public cleansing services including the collection and disposal of refuse and human waste; and lack of good drainage, adequate water supply and sewerage intensify the problem of sanitation. In addition, urban areas in Ghana have the problem of overcrowding, and poor housing.

Wright (1974) buttressed the same points when he classified the environmental problems in Ghana into three groups namely:

a) Problems associated with natural phenomena and conditions, such as flood, droughts, climatic conditions and other natural disasters;
b) Problems associated with inadequate basic sanitary measures resulting in air pollution, water pollution, etc; and
c) Problems associated with industrial and agricultural technology, such as land degradation, noise pollution, deforestation, desertification and reduction in bio-diversity.

Causes of Environmental Problems

Various causes have been attributed to environmental degradation, most of these have been attributed to an abuse of the environment by man. Even some

natural hazards that appear initially to be natural may actually owe their origin to human interference with natural environment. For example, Rawlings (1995) stated that coastal erosions are mainly due to natural causes but exacerbated by such practices as sand winning. It is a well known fact that the recent floods that were experienced in Accra resulted from buildings constructed in water paths and the dumping of solid waste in or near gutters, thus creating blockages which result in exacerbating the flood conditions.

Other examples of human-induced natural disasters include landslides and earthquakes. Landslide may result from badly managed land, deforestation or construction works. Such landslides are particularly common in tropical mountain areas as in the Himalayas and countries of South-East Asia. Earthquakes that were experienced in Denver, Colorado during the period 1962 to 1965 were believed to result from the disposal of chemical waste underground at the Rocky Mountain Arsenal, while the numerous small quakes in Nevada were believed to have been triggered by underground nuclear testing (Kevin and Owen, 1995). They further stated that many earth scientists believe that human interference with the atmosphere could result in global warming and changes to the earth atmospheric circulation that, in turn, may lead to increased natural hazards.

Beside the natural environmental hazards in which man is partly responsible, other environmental problems are wholly caused by man in his strives for economic development. Rawlings (1995) again stated that pollution is largely caused by mines and manufacturing industries, as well as by motor

vehicles. Deforestation is due to unsuitable methods of timber extraction, shifting cultivation and collection of fuel wood and fodder, which also contribute to erosion. Earlier on in 1992 the International Institute for Environmental Development (IIED) (1992) had identified population increase and its associated growth in demand for natural resources as one of the causes of environmental degradation.

Poverty has also been identified as one of the causes of environmental degradation. In 1991 and early 1992, the Stockholm Environmental Institute conducted a comparative study of selected environmental problems in the households of Accra (Ghana), Jakarta (Indonesia) and Sao Paulo (Brazil). The study revealed that, conditions were worst in Accra, the smallest and poorest of the cities surveyed, and best in Sao Paulo, the largest and wealthiest. The study concluded that wealth is a major factor in determining the environmental risks households face (McGranahan and Songsore, 1994).

The study further revealed that the local environmental problems in Ghana often arise as a result of lack of incentives for environmental management processes.

Similarly, Rawlings (1995) identified insufficient facilities and unsanitary practices as the causes for inefficient waste management in Ghana.

The International Fund for Agricultural Development (IFAD) (1999) also cited poverty as one of the causes of environmental degradation. It is stated that during the past thirty years, almost 20% of the world's top soil on croplands has

been lost mostly because of lack of money and the technology needed to carry out conservation measures.

The lack of public awareness of environmental problems and their consequences has also been echoed by the IIED (1992). This observation calls for the strengthening of EE not only in the formal sectors of education but to communities at large.

Environmental Education in Ghana

Education in Ghana has always been guided by policies and guidelines contained in policy documents. Some of the recent documents are:

- The Educational Reform of 1987.
- National Science and Technology Policy, 1997, and
- Ghana Vision 2020 Document (1998).

Though each of these documents has some distinct aims and objectives some important views recur or are implicit in all the policies and guidelines to education in Ghana (Ministry of Education, (MOE) 1998). Such views include

- providing the manpower resources for the national development in a sustainable manner;
- finding solutions to national problems; and
- a means of ensuring a sound environment (MOE, 1998).

These policies, among other things, seek to emphasise the aspect of the environment and to widen the scope of environmental education in the various curricula at the basic, secondary and tertiary levels. At the tertiary level in

particular, there has been an expansion in the environmental component in the various disciplines. For example, the chemistry departments offer courses in environmental chemistry; the biological sciences offer environmental science, while engineering offers waste, water and sanitation (Government of Ghana, 1987).

Ghana's strategic plan for effective environmental education is not restricted to the formal education sector alone, but includes the non-formal and informal areas as well.

The goals of environmental education in all these sectors are the same as those formulated at the Tbilisi conference, 1977. They are:

- to foster clear awareness of, and concern about economic, political and ecological interdependence in urban and rural areas.
- to provide every person with opportunities to acquire the values, attitudes commitment and skills needed to protect and improve the environment.
- to create new patterns of behaviour of individuals, groups and nations as a whole towards the environment (UNESCO Conference, 1977).

Environmental Education in the Formal Education Sector

For the purpose of this study environmental education in the formal sector is limited to the basic, secondary and teacher training levels of education. Before the inception of the 1987 education reform, the curriculum at the basic level of education had little on environmental issues. Subjects which focused mainly on health and hygiene in the home, and conservation of the biosphere were taught. Examples of such subjects were Nature Studies and Hygiene (Donkor, 1996).

Topics on environmental studies were later on introduced into the curriculum of science, agriculture, life skills and environmental and social studies (EPC 1994).

With the inception of the educational reform in 1987, environmental education at the basic level was known as 'Environmental Studies' at the lower and upper primary, and 'Social Studies' at the Junior Secondary School. The content at this level is a combination of environmental related topics and social studies topics. Environmental studies at this level is intended to make the child aware of his/her environment, and bring him/her to the realisation that humans, plants and all the other animals are all interdependent (Ghana MOE, 1999).

Objectives of environmental education at the basic level are to help pupils to:

i) live a healthy life

ii) become efficient users of the resources available to them in the environment.

iii) become scientific and practical in problem solving approach, etc. (MOE, 1999).

With the implementation of the SSS system, environmental education was incorporated into the agricultural science syllabus and designated "Agricultural and Environmental Studies". According to the syllabus, one term during the academic year was to be devoted to Environmental Studies while the remaining two terms to Agricultural Science (MOE, 1990).

The objectives for Environmental Studies at the SSS level are:

i) to increase the ecological consciousness of students

ii) to become aware of the seriousness of the ecological degradation of the environment and how man contributes to this process.

iii) to get the young adults and the future leaders well informed about the environmental problems and equip them with relevant skills and attitudes which will make them act positively towards the environment.

iv) to become more aware that the quality of human life, economic development and survival depends to a greater extent on the quality of the environment in which human kind strives .

v) to provide opportunities for students to participate in activities which are manifestations of an environmentally aware citizen (MOE, 1999). To achieve these objectives, ten main environmental – related topics were introduced into the SSS syllabus.

Presently at the SSS level, the 1999 syllabus for Social Studies shows that only one unit in the syllabus is devoted to environmental issues. (The topic is "Our Physical Environment"). The rest of the syllabus is concerned with Social Studies.

Some aspects of environmental issues are also incorporated in the Science, Life Skills and Agricultural Science syllabi for the Senior Secondary Schools.

In the three-year post-secondary teacher training college, the course contents on environmental education are more professionally oriented than academic. This may be attributed to the fact that students are being prepared to teach in the basic schools.

As already stated, an outline of training programmes for teachers has been given in Act 7 of Environmental Education Policy, its main view being to increase the multiplier effect of environmental awareness campaign. It also indicates that teaching methods of environmental education shall be emphasised.

The syllabus for Environmental Education, which is incorporated in that of the Social Studies focuses more on pedagogy than content. Most of the environment related topics are in the basic school syllabus, which the pre-service teacher bases his/her teaching practice on.

A survey conducted on the state of environmental education at the teacher training colleges by the curriculum unit of the Ministry of Education in 1991 and another conducted by Atsiatorme in 1992 revealed that at this level of education, environmental education topics are mostly integrated in Social Studies, Basic Science and Agricultural Science (Atsiatorme, 1992). To date the same thing still prevails.

Environmental topics in Environmental and Social Studies syllabus at the teacher-training college are:

i. Global warming and Ozone Layer Depletion

ii. Environmental Pollution and Degradation.

The specific objectives for these topics are: To enable students

- explain the terms global warming and ozone layer depletion
- discuss factors, which lead to global warming and depletion of ozone layer
- discuss the various measures necessary for the control of global warming and ozone layer depletion

- explain the term environment
- explain ways in which we depend on our environment for a living.
- describe ways in which the environment gets damaged (MOE, 1991).

The teaching method recommended by the syllabus is mostly discussion, and the mode of assessment is product assessment of the cognitive domains of students (Ministry of Education, 1991).

Out of School Education

Two main categories of people come under this sector. These are the youth out of school and adults (literates and illiterates) who need to know about the contemporary environmental issues.

In Ghana there are several organizations responsible for giving non-formal education to the general public, some of which are relevant channels through which EE could reach a large section of the populace. One of such organizations is the Non-formal Education Division of the Ministry of Education. The Non-formal Education Division (NFED) is responsible for coordinating the various organizations involved in literacy programmes in Ghana. The focus of NFED is on four main areas: Training teams; Organising Radio Programmes; Providing Post-literacy materials (Primers); and Rural newspapers in all Ghanaian languages. The current policy is that, Environmental issues are incorporated in the functional literacy programme (EPC, 1994). The NFED has incorporated in the primer, twelve themes which are directly or indirectly related to the environment. These are themes based on the use of the forest, water, soil and

some basic resources (EPC, 1994). These themes also reflect in the radio programmes, organized by NFED, and the rural newspapers as well.

Informal Education on Environmental Issues

Environmental Education is carried out informally by a number of groups and organizations. These include:

- District Environmental Management Committees
- Department of Community Development
- Non-governmental Organizations
- Agricultural Extension Services
- Religious Organizations.

As the District Assemblies are the institutions closest to environmental problems in their communities, the PNDC law 207 mandates them to implement the Environmental Action Plan, and supervise environmental management in the district. District Environmental Management Committees are formed in every district to steer the affairs of environmental problems in the communities.

The Department of Community Development (DCD) has been mandated to play a leading role in disseminating knowledge and information in rural and urban communities. This is intended to create awareness and promote participation of people in their own socio-economic development. The DCD therefore teaches communities, environmental issues (EPC, 1994).

Non-Governmental Organizations that recognize the need to collaborate with EPC in the review, implementation, monitoring and evaluation of environmental and developmental programmes in Ghana include;

- The Environmental/Disaster and Relief Sub-Committee of the Ghana Association of Private Voluntary Organization in Development;
- The Network of Environmental Non-Governmental Organizations (NENGOs); and
- National Association of Environmental Non-Governmental Organizations.

Even though the Agricultural Extension Services (AES) has no direct policy on the environment, the environment is considered in its major policy objective, which is to provide farmers and other groups with current knowledge in the sustainable use of agricultural and environmental resources.

Religious organizations also play important roles in informal environmental education. The major environmental policy of the Catholic Church, for example is to educate people on sustainable agricultural practices. The Catholic Church, through this policy succeeded in bringing together 22 church related and 12 private voluntary organizations to form an association known as the Ecumenical Association for Sustainable Agricultural and Rural Development (ECASARD). This association co-ordinates the environmental protection activities of member churches (EPC, 1994).

Knowledge Outcomes of Teacher Trainees with Respect to Environmental Education

Some studies have been conducted on the impact of EE on pre-service teachers in and outside Ghana. One of such studies was conducted in Taiwan on

the environmental knowledge, attitude and behaviour of pre-service teachers (Chi-Chin, 1993). The study showed that:

i) Students in rural teacher training colleges exhibited the lowest level of environmental knowledge and awareness of environmental problems and verbal commitment.

ii) Rural pre-service teachers had more environmental knowledge than urban teachers.

iii) Older students outscored younger ones in knowledge of environmental issues.

iv) The study further concluded that pre-service teachers are not more aware of environmental problems than senior high students.

A similar study in Taiwan by Yang (1994) showed lack of environmental knowledge as one of the major concerns expressed by pre-service secondary school teachers. Findings of a similar study carried out in Botswana by Mosothwane (1991) on "Pre-service teachers' environmental knowledge, attitude towards EE, and concern for environmental quality", revealed that there is low environmental literacy among pre-service teachers. It was suggested that a stronger EE programme should be designed to enable pre-service teachers increase their environmental literacy, which will go a long way to promote environmental awareness among the public.

In Malaysia, Siowck-Lee (1988) also found that Secondary School science teachers had not been adequately prepared to teach environmental education in schools.

On the contrary a study conducted in the Ashanti Region of Ghana by Owusu-Ansah (1997) on the Environmental attitude and knowledge of pre-service teachers revealed that respondents had high environmental knowledge.

Attitude Outcomes of Teacher Trainees with Respect to Environmental Education

Generally, in the studies conducted on the Environmental knowledge and attitudes of pre-service teachers the indication is that, respondents exhibited low knowledge on environmental issues, but high levels of environmental attitudes and concern. For example, it is stated that teachers in Taiwan expressed positive attitudes towards the environmental and a verbal commitment to environmental improvement (Chin and Penick, 1993). In another study in Taiwan, Yang (1994) stated that pre-service secondary teachers also exhibited substantial concern for environmental issues. Owusu-Ansah's study on the environmental attitude and knowledge of pre-service teachers in the Ashanti region revealed a generally positive attitude of respondents.

Influence of Some Background Variables on Environmental Knowledge and Attitudes

Some of the studies on environmental knowledge and attitudes of people have revealed that background variables such as sex, residential location, institution of learning and field of study, appear to have influence on the environmental knowledge and attitude of people. Borden and Francis (1978)

stated that individuals with high environmental concerns differ from those with low environmental concerns on a variety of personality traits. Thus traits such as gender, age, academic background, place of residence, socio-economic status, etc. are some of the variables used in studies of environmental attitudes.

Sex

Studies by Hounshell and Liggett (1973) indicated that girls' attitudes towards the environment was significantly better than boys' attitudes, but boys' knowledge in environmental issues was better than that of girls. Gifford, Hay and Boros (1983), expressed a similar view. They discovered in a study that females expressed greater concern about the environment than males did. They further stated that though females appear to know less about environmental issues they seem to be more verbally committed to issues of environmental degradation than males. They found that these findings are true both in the classroom and outside classroom situations.

Another study by Jing-Shin (1993) in Taiwan on attitudes and perceptions of pre-service secondary school teachers indicated that females' attitudes towards the environment were more positive than males' attitudes.

Similar results were reported by Donkor (1996) and Owusu-Ansah (1997) in separate studies conducted in Ghana. On the contrary, Euller (1989) found no significant differences in the environmental knowledge and attitudes of sixth-grade students of New York.

Residential Location

The findings of studies have suggested that residential location is a significant determinant of environmental knowledge and attitudes. The research findings of Owusu-Ansah (1997) revealed that urban pre-service teachers have lower level of environmental knowledge as compared to their rural counterparts. The same finding was reported by Chi-Chin (1993) about pre-service teachers in Taiwan.

On the contrary, Chin and Penick (1993) found that urban students in Taiwan secondary school possessed higher environmental knowledge and attitudes than their rural counterparts. They stated two possible factors that could account for the difference. First, there are many resources and stimuli available in urban surroundings that enhance the acquisition of environmental knowledge. Second, Taiwanese children in urban families do not only grow up in richer environment, but also receive higher level of expectation for success from their parents.

Srichai (1989) also reported that the perceptions about environmental issues differed significantly among Thai University students from different regions.

Field of Study

Another factor that has significant influence on the environmental knowledge and attitudes of people is the programme of study. In Taiwan, Yang (1994) found some relationship between the environmental attitudes of pre-service teachers and their fields of study. It was found that students who majored

in Education had more positive attitudes towards the environment than those who majored in Industrial Arts and Science. Similarly, Chin and Penick (1993) found among pre-service teachers in Taiwan that Biology and Geography majors tended to have more environmental knowledge than Chinese majors. They also reported that in-service science teachers demonstrated higher levels of environmental knowledge than non-science teachers. Similarly, Ndayitwayeko (1995) found that students of Secondary Education Programmes in Burundi exhibited higher environmental knowledge and attitudes than their counterparts of Technical Education Programmes. This could be due to the fact that environmental concepts are incorporated in science, geography and secondary education programmes.

Donkor (1996), however, found no significant differences in the attitudes of Senior Secondary School students in Cape Coast, in respect of programme of study.

Institution of Learning

This is another important determinant of environmental knowledge and attitudes. Donkor (1996), found from a study on "An Assessment of the Learning Outcomes of Environmental Studies in Senior Secondary Schools of Cape Coast," that students of both all-boys and all-girls schools had more positive attitudes towards environmental conservation than those from mixed schools. Also respondents from all-girls schools exhibited more positive attitudes towards environmental conservation than those from all-boys schools.

Srichai (1989) also reported that the environmental perceptions and attitudes of students from different Thai universities differed significantly.

Summary of Literature Review

Literature that is relevant to the study has been explored to help the researcher have a broad knowledge on the study. It came to light that even though some studies have been conducted on problems that are almost similar to the one under consideration now, they were conducted in different geographic areas using different populations. This is an indication that this study is of significance, as it will add to the body of existing knowledge.

The major conclusions drawn from the literature review can be summarized as follows:

i) Environmental Education (EE) as a field of study has been conceived differently by various educationists. While some feel that it should be focused on the content so as to create an awareness of environmental issues in people and help them acquire knowledge, skills, attitudes and commitment needed to sustain and improve the environment, others feel EE should focus more on the quality of learning process and less on content, since individuals and communities are often faced with different and sometimes, unique environmental problems.

ii) Theories of EE include:

    a) Behavourist theory – EE education is seen as an instrument that can modify behaviour.

b) Democracy theory – It is believed that environmental problems can only be solved if democracy is strengthened. It advocates that EE should be school-based, and context specific.

c) Theory of attitudes based on perceived behaviour control, degree of difficulty, and subjective norms, serving as predictors of behaviour.

d) Theory of morality – EE should provide situations in which all participants feel free to discuss and make their values explicit.

iii) There is the need for environmental education (EE) to eradicate ignorance about environmental issues, check environmental degradations including the reduction or loss of biodiversity, poor sanitation, and poor health.

iv) a) Forms of environmental degradation include soil, water and air pollution, reduction in biodiversity, poor waste management, and deforestation.

b) Causes of environmental degradation are poverty, ignorance, insufficient waste management facilities, and population increases.

v) EE in Ghana has three channels: Formal education, Non-formal education and Informal education.

vi) Background variables that influence environmental knowledge and attitudes include:

a) Sex: Females' attitudes toward the environment are better than males' attitudes, but males tend to have better knowledge about environmental issues than females.

b) Residential Location: This has a significant influence on the knowledge and attitudes of people on environmental issues.

c) Field of study: It has been found that students pursuing programmes such as science, geography and secondary education that have concepts of EE incorporated in them, exhibit higher environmental knowledge and attitudes than their counterparts in different programmes of study.

d) Institution of learning also has a significant influence on environmental knowledge and attitudes of people. For example, it has been found that students in single-sex schools exhibit higher knowledge and attitudes than those in mixed schools.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter describes the research design as well as the population and sample used in the study. It also looks at the research instruments used in the data collection, the procedure followed in collecting the data and methods of scoring as well as the data analysis.

Research Design

The study was essentially a case study on the theory and practice of environmental education among students of Nusrat Jahan Ahmadiyya (NJA) Teacher Training College, Wa, in the Upper West Region of Ghana. Case study as a research method studies a single individual or a discrete social unit such as a family, club, institution, and others (Ary, Jacobs, & Razavieh, 1979). They went further to state that the investigator tries to discover all the variables that are important in the development of the subject. The emphasis is to understand why the individual behaves in a particular manner, and how behaviour changes as the individual responds to the environment. This requires the gathering of data about

the subject's present state, past experiences, environment and how these relate to one another.

This study sought to gather data with the intention of describing the level of environmental knowledge and attitudes of students in NJA Teacher Training College, and to generalize from a sample to the population of all pre-service teachers in the College. It also sought to find out from the Environmental and Social Studies teachers the inputs that are readily available for Environmental Education (EE) lessons and the commonly used methods in lesson delivery. Finally, to compare the theory of EE with what is in practice. The case study was thus deemed the most appropriate for the purpose.

Population

The target population for the study was made up of students of NJA Teacher Training College and the Environmental and Social Studies teachers in the same college. The population comprised all the Environmental and Social Studies tutors (who were three in number, and were all males) and the second and third year Social Studies students, numbering three hundred and sixty (360). This figure comprised 94 (26%) females and 266 (74%) males. One hundred and forty-six (146) males and 46 females were in second year while 120 males and 48 females were in the third year. Students in the second and third year of studies were taken for the study in order to obtain a reliable picture of the environmental knowledge and attitudes of students since these students were supposed to have adequately covered the syllabus of the Environmental and Social Studies at the

time the data were collected. In view of the financial and time constraints ,the population was limited to the NJA Teacher Training College because of its accessibility.

Sample and Sampling Procedures

The sample for the study was made up of 120 students and 3 Environmental and Social Studies tutors of NJA Teacher Training College. The 120 students represented approximately 33% of the population. The selection of respondents was done in such a way that most of the characteristics needed for the study were taken into consideration; for instance, gender; office held in the college, residential location and senior secondary school (SSS) attended. The purposive stratified random sampling was thus employed to draw samples from males, females and prefects. The breakdown being as follows:

Second year male students – 39

Second year female students – 16

Third year male students – 39

Third year female students – 16

Male prefects – 6

Female prefects – 4

To obtain these figures, a random sampling was conducted for each of the groups, in which 'Yes' and 'No' were written on pieces of paper for members to pick. The number of Yes was restricted to the number of respondents required in each group. Students who picked Yes made up the study sample.

The rationale behind the purposive sampling was to obtain representations of males, females, and prefects in the study. It also enables the researcher to build a sample that is satisfactory to specific needs (Cohen and Manion, 1994). A proportionate sampling was also done, taking into consideration, the ratio of female to male students in the college.

Data Collection Technique

A four-part questionnaire of 68 items (Appendix A) was developed for the student respondents. In addition, a nine-item interview guide was developed to seek information on the classroom situation of EE from three Environmental and Social Studies tutors in the college. The first part of the students' questionnaire requested for background information while the second part consisted of a 29-item Environmental Knowledge Test (EKT). The third part was an EE Attitudes Test, comprising eight questions. The fourth part was an Environmental Attitude Scale (EAS) of 15 likert-type attitudinal items and 10 items also based on environmental attitude requesting mostly, 'Yes' or 'No' responses.

Background Information

The purpose of the background information was to provide data for comparing environmental knowledge and attitudes of students categorized by sex, residential location, office held in college and the type of SSS attended. These items were developed partly from the findings of studies by other people which showed that variables such as sex, residential location, field of studies, institution of learning and others have influence on environmental knowledge and attitudes.

as discussed in chapter two of this write-up. In addition to what has been found to have influence on individuals, this study also sought to find out if prefectoral position has influence on environmental attitude.

Environmental Knowledge Test

Section B of the questionnaire was Environmental Knowledge Test which sought to determine the extent of attainment of the cognitive objectives of Environmental Studies (ES). It comprised 29 items, which demanded "True or False" responses. The "True or False" test items formed a predominant part of the questionnaire because it enables the researcher obtain quickly, information from a large sample. It also makes scoring and interpretation of results easier than the free-response tests. In deciding to use this type of test construction, consideration was given to the time demand on the researcher. The free-response test, though creates room for respondents to express their own views, Sproul (1988) observed that it could create respondents' resentment about the task, which creates invalid response.

The EKT was based mostly on the content and objectives of the Environmental Studies Syllabus (Ministry of Education, 1999). Fifty test items were given to two experienced ES teachers to determine items' suitability for measuring the cognitive objectives of ES. They also screened the items for clarity of wording and presentation. Items that were identified as ambiguous were re-constructed and those declared unsuitable were deleted. Thus 29 items were retained after the screening. To ensure an adequate level of test reliability, many test items were developed to cover all major topics in the syllabus.

Environmental Education Attitude Test

The third part of the questionnaire focused on the attitude of students toward EE. This sought to find out students' perceptions about EE and the methods employed by Environmental Studies (ES) tutors in teaching the subject, as well as the form of assessment the subject takes.

Environmental Attitude Test

The fourth part of the questionnaire focused on environmental attitude, and was assessed by means of Environmental Attitude Scale (EAS) and 'Yes' or 'No' response test items. The purpose of this was to evaluate the extent of attainment of the affective objectives of Environmental Studies. This comprised 15 likert-type attitudinal items, 9 'yes' or 'no' response items and one multiple-choice test item. It must be admitted that these were all proxy measures of students' feelings toward environmental issues. For example, students might express the need for environmental cleanliness but in reality do not practise it. A reliable picture of students' attitude could have been achieved using other approaches like direct observation of students, especially when they are not aware that they are being observed, in addition to the pen and paper test, had time permitted it.

The likert scale, according to Oppenheim (1986), provides more precise information about the degree to which a respondent agrees or disagrees with attitude objects and its reliability tends to be good. However, different response patterns can produce the same total score and two or more identical responses may have different meanings.

Instead of the traditional five-point scale (Strongly Agree, Agree, Not sure, Disagree, Strongly Disagree), the four-point scale was used for the study, based on the findings of Casely and Kumar (1988) that there is the tendency for individuals to select responses in the centre of the scale. A similar view has been expressed by Anderson (1981). He stated that with an even number of response options, the respondents are compelled to choose between favourable and unfavourable responses to the attitude object. The four-point scale for the EAS were: Strongly Agree, Agree, Disagree, Strongly Disagree.

The Environmental Attitude Test items consisted of statements that were either favourable (positive) or unfavourable (negative) with respect to attitudes toward the environment.

The Environmental Studies tutors who vetted the EKT items were again asked to vet these test items. They first of all determined whether the statements were true measures of the attitudinal change envisaged by the ES syllabus. Items that were not suitable were eliminated. They also classified the statements into positive, negative and neutral with regard to environmental attitude. Those that were considered neutral or ambiguous were again eliminated.

The interview guide (Appendix B) also sought the academic and professional qualifications of ES tutors in the college, their teaching experiences, their work load, the teaching methodology they commonly employed as well as the assessment techniques they used most. These are variables that tend to influence environmental knowledge and attitudes of students toward Environmental Studies and consequently their attitude toward the environment.

Pilot Study

A pilot study was conducted for the following purposes:

- to restructure some of the items on the pre-test questionnaire
- to select items for the final instrument
- to determine the reliability of the final instrument
- to determine the approximate time needed by the respondents to complete the final questionnaire.

The pre-testing of the questionnaire, which was conducted on 3rd October 2004, was administered to 20 students. These were made up of 12 male and 8 female second and third year Social Studies students, randomly selected from NJA Teacher Training College because of proximity. Also included in this sample were 4 prefects (2 males and 2 females). Before the administration of the questionnaire, the purpose of the study was explained to students. Participants were encouraged to do independent work and to underline words that they did not understand.

At the start of the exercise, the time was recorded and again recorded at the time of completion on the individual's completed questionnaire as they submitted them. It was realized that most participants completed the work within one hour. This was an indication that an average of one hour was required to complete the questionnaires.

Words that the students reported they did not understand were replaced with their synonyms or phrases that best explained them in the final instrument. The data collected from the pilot study were used to calculate reliability co-

efficiency of the instruments. The split-half reliability co-efficiencies which were computed to determine the consistencies of items were 0.64, 0.74 and 0.63 for EKT, EEA and EAT respectively. Considering the assertion of McDonald (1978), that if the results of reliability measurement are to be used for making a decision about a group or for research purpose, a reliability co-efficient as low as 0.30 might be acceptable, results of the pilot test showed that the test items were thus reliable.

Data Collection

The selected students were all assembled in a hall and the questionnaires administered personally by the researcher on the 12th day of October, 2004, after a written permission (Appendix C) was sought and obtained from the Principal of the college. Before administering the questionnaires, the purpose of the study was explained to the respondents. They were entreated to do independent work and to respond to every item on the questionnaire. At the end of the exercise, which lasted about one hour, the questionnaires were collected for analysis.

The interview was also conducted personally by the researcher at the convenient time fixed by each of the three Social Studies tutors in the college.

Data Analysis Procedure

The data obtained from respondents were statistically analyzed using mostly, descriptive and inferential statistics. The questionnaires returned by respondents were given serial numbers to facilitate identification.

For environmental knowledge test, a correct response scored one mark while a wrong one scored zero. The cut-off point was 14.5 (50%) since the total mark was 29. By the standard of the teacher training college grading system, 50% (grade D) is a pass.

On the part of the environmental attitude test, environmentally favourable items were scored in a descending order (Strongly Agree – 4, Agree – 3, Disagree – 2, Strongly Disagree – 1), while environmentally unfavourable or negative items were scored in an ascending order (Strongly Agree –1, Agree – 2, Disagree – 3, Strongly Disagree – 4).

For the 'Yes or No' response test items, a mark each was awarded to statements that conformed to environmentally favourable attitudes while no mark was awarded to those that did not conform to environmentally positive attitudes. Taking the marking scheme and the number of test items into consideration, the most environmentally positive respondent could score 94 marks while the least could score 21 marks. The sum of highest and lowest scores divided by two (57.5) became the cut-off point. Thus respondents who scored at least, 57.5 marks were considered environmentally positive while those who scored below 57.5 were considered environmentally negative.

The performances of respondents in the environmental knowledge and attitude tests were used to assess the influence of selected background variables (gender, SSS attended, residential location, position held in college) on their environmental knowledge and attitudes.

The Statistical Product for Service Solution (SPSS) software programme was used to analyse the data. The main statistical tool used was the Independent Samples T-test at a significance level of 0.050, and a confidence interval of 95%. The T-test was deemed most appropriate as compared to the Analysis of Variance (ANOVA) and others because the number of means compared in all cases, did not exceed two.

Recurring responses in the environmental attitude test were coded, so were the frequencies of various teaching methods, teaching-learning materials and forms of assessment used by Environmental Education (EE) teachers. These were used to assess respondents' attitudes toward Environmental Education as well as the teaching and assessment methods used mostly.

The responses of EE teachers to the interview questions were used to assess the calibre of teachers handling the subject and the teacher – student ratio, as well as the teaching and assessment methods used.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the results and discussion of the study under the following headings:

- Description of the study sample
- How much knowledge have students acquired on environmental issues?
- What is the relationship between selected background variables (gender, SSS attended) and the environmental knowledge of students?
- Do students realise the need for Environmental Education (EE)?
- Does the theory in EE conform with the practice in terms of teacher-student ratio, qualification and experiences of teachers, teaching methods, teaching-learning materials and forms of assessment employed by EE teachers?
- What attitudes have students formed about environmental management?
- What is the relationship between selected background variables (gender, SSS attended, office held in college, residential location) and the environmental attitudes of students?

Description of Study Sample

The study sample comprised 120 students and three Environmental Studies tutors of NJA Teacher Training College. The sample represented approximately 33 percent of the second and third year students' population. Some characteristics needed in the study were taken into consideration in the selection of the sample. These included gender, and office held in the college. The sample thus, comprised 84 males and 36 females, including 6 male prefects and 4 female prefects.

The purposive, stratified random sampling was therefore employed to draw the sample from second and third year Social Studies students in the college. These year groups were considered most appropriate because they were supposed to have adequately covered the Environmental and Social Studies syllabus at the time of the study. There were 39 males and 16 females each from second and third years as well as 6 male and 4 female prefects from both year groups. Analysis of the data revealed other background information as follows:

Boarding SSS graduates -78

Day SSS graduates - 42

Mixed SSS graduates - 65

Single Sex SSS graduates - 55

Residents of farming areas - 66

Residents of commercial areas -54

How Much Knowledge have Students Acquired on Environmental Issues?

This section presents the environmental knowledge of students as obtained from the environmental knowledge test. The data obtained from the test were analyzed to determine the extent to which the cognitive objectives of Environmental Studies have been achieved. The grouped frequency distribution of the raw scores (out of 29) of the environmental knowledge test (EKT) is presented in Table 4.1.

Table 4.1.

Overall Frequency Distribution of Environmental Knowledge Test (EKT) Scores.

EKT Scores Range	Percentage Range (%)	Grade	No. of Respondents
15 – 17	51.7 – 58.6	D – D+	5
18 – 20	62.1 – 69	C – C+	9
21 – 23	72.4 – 79.3	B – B+	41
24 – 26	82.8 – 89.7	A	56
27 – 29	93.1 – 100	A	9
Total			120

Mean = 23
Mode = 25
Standard Deviation = 2.7

The results show that the minimum score was within range 15 -17 (51.7% - 58.6%) while the maximum was within range 27 – 29 (93.1% - 100%). Thus the range for the scores was 12 (41.5%). The mean score was 23.15 (79.8%) with a standard deviation (SD) of 2.7. The modal score was 25 with a frequency of 24, representing 20% of the respondents.

The results show that no student scored below 50% in the environmental knowledge test. This means that, no one failed in the test since by the grading standard for teacher training colleges, 50% is the cut-off point. As many as 65 students, representing 54% of the sample got grade A while only 5 (4%) students got grades ranging between D and D+.

Item by item analysis of students' performance revealed that item 2.6 which sought students' knowledge on common environmental problems in Ghana, had the least number of correct responses. Only 12 students, representing 10% of the respondents had this item correct.

This indicated that respondents were not abreast with the environmental problems the country faces. This is quite disturbing because if teacher trainees are not aware of these problems they cannot address them or educate their pupils in the future to address them. However, on the whole, the extent of attainment of the cognitive objectives was good. This may be attributed to emphasis laid on EE in the country, right from basic to the tertiary level of education. It is however, worth noting that despite government's effort to bring EE to the doorsteps of everybody, most Ghanaians practise poor environmental management, resulting in floods, deforestation, filthy surroundings, to mention a

few. What is required may be a type of EE that inculcates in the learner, sound environmental practices. This should involve practical and not just the theory aspect.

The results of the study were in conformity with a similar study conducted in the Ashanti Region of Ghana by Owusu-Ansah (1997). His study on the environmental attitude and knowledge of pre-service teachers revealed that respondents had high environmental knowledge. The findings, however, refute those of Yang (1994) and Mosothwane (1991) in separate studies conducted in Taiwan and Botswana respectively. They found that pre-service teachers had low environmental knowledge.

What is the Relationship between Selected Background Variables (Gender, SSS Attended) and Environmental Knowledge of Students?

This section examines the relationships between environmental knowledge, as measured by the EKT scores and background variables such as gender, and type of senior secondary school (SSS) attended.

Gender

Table 4.2 shows the results of the t-test for equality of means in the EKT scores by gender. The male students had a mean score of 23.8 (82%) and a standard deviation of 2.2, while the female students had a mean score of 22.4 (77%) with a standard deviation of 3.5.

Table 4.2.

T-test Results for Equality of Means in Environment Knowledge Test (EKT) by Gender

Sex	No of Respondents	Mean	STD Deviation	Mode
Males	84	23.8	2.2	25
Females	36	22.4	3.5	24
Total	120			

Significance Level: 0.050.

The result of the t-test for significance in difference (0.010) indicates that the difference between the environment knowledge test scores of the male and female respondents was statistically significant.

The results further showed that female respondents scored the lowest mark while males scored the highest mark. Thus male respondents had a higher environmental knowledge than their female counterparts.

Type of Senior Secondary School (SSS) Attended (Boarding and Day)

The data on EKT was analyzed in terms of the type of SSS the respondents attended. Table 4. 3 shows the results of t-test for equality of means according to the type of SSS they attended (Boarding and day). From the table it was revealed that 78 (65%) of the respondents completed boarding SSS and 42 (35 %) completed day SSS.

Students from boarding SSS scored the higher mean of 23.6 (81 %) with a standard deviation of 2.6 while those from the day SSS scored the lower mean of 22.55 (77.75%) with a standard deviation of 3.05. The result of the t-test for significance in difference (0.049) shows that the difference was statistical significant.

It may be deduced from the results that boarding facilities favour academic work better than those in day schools. When students commute between home and school, their attentions are divided between studies and work in the home and this affects their academic performance.

Table 4.3.

T-test Results for Equality of Means in Environment Knowledge Test (EKT) According to SSS Attended (Boarding and Day)

Sex	No of Respondents	Mean	STD Deviation	Mode
Boarding	78	23.6	2.6	25
Day	42	22.5	3.05	23
Total	120			

Significance Level: 0.050.

Type of SSS Attended (Mixed and Single-sex)

The results of t-test for respondents who attended mixed SSS as against those who attended single – sex SSS are presented in Table 4.4. The mean score for respondents from mixed SSS was 22.65 with a standard deviation of 2.4, and a

modal score of 23. Eighteen (18) respondents obtained the modal score. Respondents from single-sex SSS had a mean score of 23.1 with a standard deviation of 2.4 and a modal score of 25. The modal score had a frequency of 18. The t-test result for significance in difference (0.72) shows that respondents from single-sex SSS had a slightly higher knowledge of Environmental Studies than their counterparts from the mixed SSS, but this is statistically insignificant.

Table 4.4.

T-test Results for Equality of Means in Environment Knowledge Test (EKT) According to SSS Attended (Mixed and Single)

Sex	No of Respondents	Mean	STD Deviation	Mode
Mixed	65	22.6	2.5	23
Single-Sex	55	23.7	2.4	25
Total	120			

Significance Level: 0.050.

Do Students Realize the Need for Environmental Education (EE)?

Items 3.1, 3.2, 3.7 and 3.8 of the questionnaire were designed to gather information on students' attitude toward EE. All the respondents agreed that EE was a necessary subject in the teacher training college curriculum. All except

three of the respondents also agreed they liked EE. The reasons they gave are summarized as follows:

- Learning the subject at the teacher training college equips teacher trainees with enough knowledge and skills, to enable them impart the same to the pupils at the basic level of education whom they are being trained to teach.
- It creates in them awareness about the environmental hazards and how to curb these hazards. This is in line with the assertion of Danquah (1997) that environmental awareness needs more emphasis because a good section of the populace continues to abuse the environment out of ignorance.
- It inculcates in them the habit of environmental conservation.
- Knowledge of the subject enables them maintain clean and healthy physical environment.

Does the Theory in EE Conform with the Practice in terms of Teacher-Student Ratio, Qualification and Experiences of Teachers, Teaching Methods, Teaching-Learning Materials and Forms of Assessment Employed by EE Teachers?

Regarding the teaching methods employed by Environmental Studies tutors in teaching of the subject, 98% of student respondents and all the three tutors interviewed stated discussion as the method very often used. They also indicated that lecture was often used, practical lessons and experiments were rarely used, while field trips were never used. The reasons they gave for rarely employing practical lessons and demonstrations were, large class size and

inadequate time allotted for the subject on the teaching time slot. For the field trips, the tutors said they did not employ them as a teaching method because of in adequate funds and non-availability of transport, coupled with the large class size.

All respondents stated written test as the form of assessment very often used by Environmental Studies tutors; oral test was rarely used and practical test never used. It was also observed that tutors did not encourage students to carry out practical work such as tree planting and watering of lawns among others.

On the average, a class size was 42 and six of such classes were shared among three tutors of Environmental Studies. The teacher-student ratio was thus 1:84. This does not conform to the 1:15 teacher-student ratio advocated in the 1987 education reform document. It came to light that Environmental Studies tutors rarely made use of teaching-learning materials. All the teachers were experienced graduate teachers with teaching experience in the subject ranging between six to eleven years.

What Attitudes have Students Formed about Environmental Management?

One of the main objectives of Environmental Education (EE) is to promote a positive attitude toward the environment such as conservation of the environment. The section of the questionnaire on environmental attitude was designed to attract a maximum of 94 marks and a minimum of 21 marks. Therefore, respondents exhibiting the highest degree of positive attitude toward the environment could score 94 points while those declaring the most

unfavourable attitude could score 21 points. The cut-off point for positive attitude was half the sum of the highest and lowest scores (57.5).

Table 4.5 presents the overall grouped frequency distribution scores for the Environmental Attitude Scale (EAS).

Table 4.5.

Overall Frequency Distribution of Environmental Attitude Scale (EAS) Scores

Scores Range	Percentage Range (%)	Number of Respondents
50-54	43.5 – 49.9	2
55-59	47.8 – 51.3	3
60-64	52.2 – 55.6	3
65-69	56.5 – 60	17
70-74	60.8 – 64.3	55
75-79	65.2 – 68.7	26
80-84	69.6 – 73.1	14
Total		120

Mean - 71.6
Mode - 73
Standard Deviation – 6.4

The highest score obtained in the study was within range 80 – 84 and the lowest was within range 50 – 54. The mean score for the sample was 71.6 with a

standard deviation of 6.4. The modal score was 73, which had a frequency of 20. This means that 16.7% of the respondents obtained the modal score.

Only 2 respondents scored below the cut-off point. This indicates that theoretically, 98.3% of the respondents exhibited environmental positiveness. They know sound environmental management and may or may not practise it. This environmental positiveness may be attributed to the current high level of EE campaign and programmes that have been mounted by the Ministry of Education in conjunction with the Ministry of Environment in the Media.

What is the Relationship between Selected Background Variables (Gender, SSS Attended, Position held in College, Residential Location) and the Environmental Attitudes of Students?

This sub-section examines the relationships between attitudes toward the environment and background variables (gender, SSS attended, residential location and office held in the college).

Gender

The t-test results of Environmental Attitude Scale (EAS) scores according to gender are presented in Table 4.6. The mean score for the EAS for males was 70.4 with a standard deviation of 7.04, while the females had 72.1 as the mean score with a standard deviation of 5.9. The modal scores for the males were 57 and 73, scored by 17 respondents each. For the females the modal score was 70 and was obtained by 8 respondents. The result of the t-test for significance in difference (0.028) shows that a statistically significant difference existed between

the environmental attitudes of males and those of females. This shows that the females had a more positive environmental attitude than the male respondents. This finding conforms to findings by Jing-Shin (1993), Donkor (1996) and Owusu-Ansah (1997) in separate studies conducted in Taiwan, Central Region and Ashanti Region of Ghana respectively. They found significant differences in the environmental attitudes of males and females, similar to this study.

Table 4.6.

T-test Results for Equality of Means in Environmental Attitude Scale (EAS) Scores by Gender

Sex	Number of Respondents	Mean	STD Deviation	Mode
Males	84	70.4	7.04	57&73
Females	36	72.1	5.92	70
Total	120			

Significance Level: 0.050.

The traditional domestic cleaning roles assigned to females right from childhood is probably a contributory factor to their being environmentally positive.

Type of Senior Secondary School (SSS) Attended (Boarding and Day).

Table 4.7 presents the t-test results for equality of means in the Environmental Attitude Scale according to the type of SSS attended (Boarding and Day).

Table 4.7.

T-test Results for Equality of Means in Environmental Attitude Scale (EAS) Scores According to SSS Attended (Day and Boarding)

SSS Attended	Number of Respondents	Mean	STD Deviation	Mode
Boarding	78	71.6	6.4	73
Day	42	71.6	6.0	71
Total	120			

Significance Level: 0.050.

The data show that there is no difference in the environmental attitudes of boarding and day SSS graduates. Both groups had 71.6 as mean scores, indicating environmentally positive attitudes. The result of the t-test for significance in difference (0.99) is more than 0.050, which indicates that it is not statistically significant.

Type of Senior Secondary School (SSS) Attended (Mixed and Single-sex)

The data were also analyzed according to mixed and single-sex SSS graduates. Table 4.8 presents the t-test results of students by types of SSS attended (mixed and single-sex). Respondents who attended mixed SSS had 65.8 as mean score with a standard deviation of 7.3, as against a mean score of 71 and a standard deviation of 6.3 obtained by those from single-sex SSS. The modal score for mixed SSS graduates was 57, which was obtained by 14 respondents

while that of the single-sex graduates was 73 and was obtained by 14 respondents too.

Table 4.8.

T-test Results for Equality of Means in Environmental Attitude Scale (EAS) Scores According to SSS Attended (Mixed and Single-Sex)

SSS Attended	Number of Respondents	Mean	STD Deviation	Mode
Mixed	65	65.8	7.3	57
Single Sex	55	71	6.3	73
Total	120			

Significance Level: 0.050.

The difference is statistically significant as the result of the t-test for significance in difference was 0.041 which is less than 0.050. This is in agreement with the findings of Donkor (1996) in a study on "An Assessment of the Learning Outcomes of Environmental Studies in SSS in Cape Coast". He found out that students in all-boys and all-girls schools had more positive attitudes toward environmental conservation than those in mixed schools.

Office Held in College

The EAS scores were analyzed according to the office held in the college. Prefects in the college obtained the higher mean score of 72.2 with a standard

deviation of 5.9, while non-prefects obtained the lower mean score of 70.5 with a standard deviation of 6.4.

Table 4.9.

T-test Results for Equality of Means in Environmental Attitude Scale (EAS) Scores According to Held in College

Office Held	Number of Respondents	Mean	STD Deviation	Mode
Prefects	10	72.2	5.9	73
Non-prefects	110	70	6.4	57
Total	120			

Significance Level: 0.050.

The result of t-test for significance in difference (0.050) shows that a significant difference in attitude toward the environment existed between prefects and non-prefects in the college

Probably by virtue of their position in the college administration, the prefects felt obliged to lead exemplary lives for other students to emulate.

Table 4.9 shows the t-test results for equality of means of Environmental Attitude Scale (EAS) according to office held in the college.

Residential Location (Commercial and Farming)

The results of the t-test for equality of means of Environmental Attitude Scale scores according to the residential location of respondents are presented in

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Introduction

This research was conducted to assess the extent to which the practice of environmental education conforms to theory, a case study of Nusrat Jahan Ahmadiyya (NJA) Teacher Training College, Wa in the Upper West Region of Ghana. The influence of some background variables (gender, type of senior secondary school attended, office held in the college, residential location) on environmental knowledge and attitudes of teacher trainees was also examined. The research sample was 33% of the second and third year Social Studies students as these were supposed to have adequately covered the Environmental Studies syllabus.

This chapter which is the conclusion of the study focuses on:

(i) Summary of findings

(ii) Conclusions of study

(iii) Educational Implications of the study

(iv) Recommendations for Future Research

Summary of Findings

This sub-section summarizes the findings of the study as sought by the research questions:

- Does the theory in EE conform with the practice in terms of teacher-student ratio, qualification and experiences of teachers, teaching methods, teaching-learning materials and forms of assessment employed by EE teachers?
- Do students realise the need for Environmental Education (EE)?
- How much knowledge have students acquired on environmental issues?
- What is the relationship between selected background variables (gender, SSS attended) and the environmental knowledge of students?
- What attitudes have students formed about environmental management?
- What is the relationship between selected background variable (gender, SSS attended, office held in college, residential location) and the environmental attitudes of students?

On the nature of EE in the teacher training college, the study revealed that the teaching method mostly employed by Environmental Studies (ES) tutors in the college was discussion, followed by lecture method. Practical and experimental methods were rarely used, while field trips were never used due to lack of funds and means of transport, coupled with the large size of classes. Also as a result of financial constraints tutors seldom used teaching-learning materials during lesson delivery. Regarding assessment of trainees in the subject, written test were mostly used. Practical tests were never used to assess trainees'

knowledge and skills in the subject. Students were also not encouraged to carry out practical work like tree planting and watering of lawns.

Even though experienced graduate teachers taught the subject, the study showed that field trips and the practical aspect were neglected because of large class size, inadequate funds, and inadequate contact hours for the subject. It also came to light that the teacher-student ratio was 1:84 which exceeded by far the 1:15 envisaged in the 1987 Education Reform document.

Responding to the question on the attitude of teacher trainees toward EE, all except three of the respondents stated they liked Environmental Studies because not only does it equip them with knowledge and skills to enable them teach the subject at the basic level of education, it also creates in them an awareness of global environmental issues and the measures required to curb environmental problems. As Danquah (1997) rightly pointed out, a good section of the populace continues to abuse the environment out of ignorance and therefore more emphasis should be placed on environmental awareness.

Finding in relation to knowledge outcomes of Environmental Studies showed that:

1) On the whole, the environmental knowledge of students was high.
2) Male respondents had a significantly higher environmental knowledge than their female counterparts.
3) Students from boarding senior secondary schools (SSS) had a significantly higher mean score than those from day SSS.

4) Majority of the respondents (90%) did not know the current environment problems in Ghana.

In theory, the environmental attitude of students was good. Over 98% of respondents exhibited environmental positiveness. Females exhibited more positive environmental attitudes than their male counterparts. Similarly respondents who attended single-sex SSS had more positive environmental attitudes than those who attended mixed SSS. Also prefects of the college exhibited more positive environmental attitudes than non-prefects.

However, the difference in environmental attitudes between respondents who lived in commercial areas and those who lived in farming or rural areas as well as that of boarding and day SSS graduates was statistically insignificant.

Conclusion of the Study

Based on the results of the study, the following conclusions were arrived at:

- To a large extent, the practice in Environmental Education was in conformity with the theory in the sense that the tutors handling the subject were experienced, qualified graduate teachers. In addition, the subject had been catered for on the teaching time slot. Also students were taught and assessed theoretically in the subject. However, more needed to be done on the financial aspect to promote field trips and the acquisition of teaching-learning materials for effective teaching. The teacher-student ratio was also too high for

effective practical lesson and assessment. In addition, the time allotted for teaching of the subject was insufficient for practical lessons.

- Although male respondents had higher environmental knowledge than female students, the latter had more positive environmental attitudes than the former.
- Boarding status at the SSS level promotes better environmental knowledge than non-boarding.
- Office held in the college appeared to have influence on environmental attitude as prefects exhibited more positive environmental attitudes than non-prefects.
- Students from single-sex SSS had better environmental attitude than those from mixed SSS. However, environmental attitude was not influenced by residential location and boarding status of students at the SSS level of their education.

Educational Implications of the Study

The findings of the study brought to the fore some implications for the improvement of Environmental Education (EE) in the teacher training college system.

(i) There is the need to train more Environmental Studies tutors for the training colleges to reduce the teacher-student ratio for effective teaching.

(ii) More funds are required for field trips, practical lessons and teaching-learning materials.

(iii) Government should strive to make all SSS boarding since learning is more effective in the boarding system.

Recommendations for Future Research

(i) This study was conducted in only one training college. It is recommended that similar investigations be conducted at regional levels to determine the extent to which theory of environmental education conforms to practice.

(ii) The reasons for differences in environmental attitude that exist between teacher trainees from mixed SSS and those from single-sex SSS is also an area worth investigating.

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APPENDIX A

QUESTIONNAIRE

INSTITUTE OF EDUCATION
UNIVERSITY OF CAPE COAST

A study is being conducted on the "Theory and Practice in Environmental Education". A case study of Nusrat Jahan Ahmadiyya (N. J. A.) Teacher Training College, by a student in the above named department.

This questionnaire that you are requested to complete forms part of the study. Kindly read through and respond to the various items. Be assured that your responses will be treated with confidentiality. It would be most appreciated if you respond to every item in the questionnaire. Note that your name is not required.

Thank you.

SECTION A

BACKGROUND INFORMATION

Tick (√) in the appropriate box.

1.1 Sex: Male [ ] Female[ ]

1.2 SSS attended: (a) Boarding [ ] Day [ ]

(b) Mixed [ ] Single sex [ ]

1.3 Position held in College:

Senior Prefect	[ ]	Agricultural Prefect	[ ]
Assistant Senior Prefect	[ ]	State any other	
Dining hall Prefect	[ ]	None of these	[ ]
House Prefect	[ ]		
Library Prefect	[ ]		
Compound Prefect	[ ]		

1.4 Where have you lived most part of your life?

i) Name of town/village.....

Suburb	Industrial area	[ ]
	Commercial area	[ ]
	Mining area	[ ]
	Farming area	[ ]
	State any other	

1.5 Where do you normally spend your holidays?

ii) Name of town/village.....

Suburb	Industrial area	[ ]
	Commercial area	[ ]
	Mining area	[ ]
	Farming area	[ ]
	State any other	

1.6a) In what type of housing unit do you and your family live?

Compound house	[ ]
Detached house	[ ]

Semi-detached house [ ]

Bungalow [ ]

1.6b) What kind of toilet facilities are available in your house?

Water closet (wc) [ ]

KVIP [ ]

Pit latrine [ ]

Free range [ ]

SECTION B

ENVIRONMENTAL KNOWLEDGE TEST

Please, tick what you consider applicable.

2.1 An increase in the use of Liquefied Petroleum Gas (LPG) is **NOT** a manifestation (evidence) of a decline of the environment.

a) True b) False

2.2 The human physical environment includes all the following; water bodies, land and vegetation, and air.

a) True b) False

2.3 Inculcating in learners, the habit of decent dressing is NOT a component of Environmental Education (EE).

a) True b) False

2.4 All the following activities should be employed in environmental lessons:

i) Encouraging participatory teaching and learning

ii) Address the cognitive, affective and psychomotor domains of students in the teaching-learning process.

iii) Making use of the surrounding environment as a teaching-learning material.

a) True b) False

2.5 Decomposers are the organisms, which break down the complex organic compounds in the dead organisms into smaller forms for use by green plants.

a) True b) False

2.6 With the exception of acid rains, all of the following are environmental problems in Ghana currently:

i) Reduction of the country's vegetation cover

ii) Inefficient waste management

iii) Coastal erosion

a) True b) False

2.7 All the following contribute to the deterioration of the environment:

i) The use of machine in land cultivation

ii) Gathering of wild fruits for food

iii) Over population

a) True b) False

2.8 Raw sewage disposal into the sea adversely affects marine life.

a) True b) False

2.9 Industrial waste is **NOT** a major cause of sea pollution.

a) True b) False

2.10 All the following activities are pertinent in Nusrat Jahan Ahmadiyya (NJA) teacher training college (TTC) that may pose health-related problems to residents in the school:

i) Indiscriminate waste disposal and defecation by students around the school compound.

ii) Littering by students and residents around the school compound

iii) Poor drainage system

a) True b) False

2.11 Excessive weeding and over-grazing removes vegetation cover on the soil leading to all the following:

i) Increased soil erosion

ii) Increased evaporation in the soil

iii) Reduction in the activities of soil organisms

a) True b) False

2.12 The following practices can be used to control or prevent ecological problems:

i) Growing vegetation cover

ii) Construction and maintenance of good drainage system

iii) Construction of incinerators (apparatus for burning refuse) on the school compound.

a) True b) False

2.13 The gradual deterioration of the environment leading to the inability of the resources to support plant and animal life is generally referred to as

a) Environmental degradation b) Desertification

2.14 Declining crop yield, deforestation and over-grazed pastures are all observable features of

a) Environmental pollution b) Environmental degradation

2.15 With the exception of laterization all the following environmental hazards are possible outcomes of frequent bushfires:

i) Disappearance of wild life

ii) Desertification

iii) Widespread parasitic weeds

a) True b) False

2.16 Desertification is the migration of people from the forest to desert areas.

a) True b) False

2.17 Reafforestation leads to a decline in the quality of the school environment.

a) True b) False

2.18 It is impossible for environmental changes in one country to affect the whole world.

a) True b) False

2.19 Pollution can generally be defined as the presence of matter and energy whose nature, location or quantity becomes a threat to plant and animal life.

a) True b) False

2.20 In pollution caused by agro-chemicals the following occur:

i) The chemical residues contaminate lakes and seas

ii) The chemical residues leach into the groundwater

iii) The chemical residues contaminate the vegetables

a) True b) False

2.21 The non-enforcement of the rules and regulations regarding the general planning and development of human settlements has resulted, in some parts of the country, in slums, poor sanitary conditions, and traffic congestion.

a) True b) False

2.22 Establishment of more national parks by the Department of Game and Wildlife is a way of protecting wildlife resources in Ghana.

a) True b) False

2.23 Clearing of vegetation around rivers and streams is a way of controlling environmental degradation.

a) True b) False

2.24 All the following are environmental conservation measures:

i) Practicing agro-forestry

ii) Woodlot farming

iii) Creation of forest reserves

a) True b) False

2.25 The reasons for planting trees on our compound and around our farms include all of the following:

i) To help check erosion

ii) To help maintain the soil and water base for agriculture production

iii) To maintain an ecological balance in our environment

a) True b) False

2.26 Waste management may be defined as

a) Measures adopted to control waste substances

b) Collection and proper disposal of domestic and industrial waste.

2.27 The major disadvantage of domestic waste disposal by burning is

a) Its inability to treat large quantities of waste

b) The creation of smoke and causing air pollution

2.28 Processing the waste into compost is recommended for agricultural waste disposal.

a) True b) False

2.29 The principle of "meeting the needs of the present generation without putting in danger the needs of future generations to meet their own needs" is referred to as

a) Continuous development

b) Sustainable development

SECTION C

ATTITUDE TOWARD ENVIRONMENTAL EDUCATION (EE)

3.1 Do you see EE as a necessary subject in the teacher training college curriculum?

a) Yes [ ] b) No [ ]

3.2 Give one reason for your answer to question 3.1.

.....

.....

3.3 What teaching methods do your EE teachers use?

		Very often	Often	Rarely	Never
a)	Lecture				
b)	Demonstration				
c)	Discussion				
d)	Practical				
e)	Field trip				
f)	Experimental				

g) State any other.....

3.4 List some of the teaching-learning materials used by your EE teachers

.....

.....

3.5 What form of assessment do your EE teachers use?

		Very often	Often	Rarely	Never
a)	Written test				
b)	Oral test				
c)	Practical				
d)	State any other.....				

3.6 Does your teacher allow you to do practical work such as tree planting, watering lawns, etc.?

a) Yes [ ] b) No [ ]

3.7 Do you like EE lessons?

a) Yes [ ] b) No [ ]

3.8 Give reasons for your answer to question 3.7.

.....

.....

SECTION D

ATTITUDE TOWARD THE ENVIRONMENT

Please read the statements carefully and show by a tick (√) in the appropriate box, the extent to which you agree or disagree with each statement:

Tick (SA) If you Strongly Agree

(A) If you Agree

(D) If you Disagree

(SD) If you Strongly Disagree

	Strongly Agree	Agree	Disagree	Strongly Disagree
	SA	A	D	SD
4.1 Reducing resources consumption must be part of each individual's sense of responsibility.				
4.2 Human interest must receive more attention than the conserving of species.				
4.3 Protecting wild species is not a duty to the species themselves, but a duty to human beings.				
4.4 We should not waste time conserving plant and animal species since they are freely available for man's use.				
4.5 We must have respect for fauna (animals), flora (plants), landscapes and ecosystems.				
4.6 My participation in any tree planting exercise depends on the financial reward (money) that goes with it.				
4.7 Though commercial loggers (timber contractors) pay for the trees they fell, they				

must be made to replace them by planting new ones.				
4.8 Forest reserves need to be released to farmers for cultivation.				
4.9 I would rather be poor than offer my land for sand winning in return for money				
4.10 The use of DDT and other pesticides in killing mosquitoes (as malaria control) should be discouraged				
4.11 Consumers should obtain plastic (rubber) bags in shops for their goods instead of carrying with them reusable shopping bags or baskets.				
4.12 Aerosols (example body spray) containing CFCs (chemical substances that damage the ozone layer) must not be bought.				
4.13 Even though imported produce generally contains more pesticide residues than domestic fruits and vegetables, they will continue to be my first choice.				
[4.14 People should not support legislations (laws) requiring the seller to prove				

environmental safeness before distributing a new produce.				
4.15 The following are some of the actions one needs to consider, in solving most Environmental problems in his area. a) Complain b) Use a car less frequently c) Planting more trees d) Pay high prices for goods so that industry could recycle and install anti-pollution devices in the factory. e) Join a neighbourhood or environmental group that shows concern about the environment f) Attend District Assembly meetings and hearings on Environmental issues. g) Vote for environmental legislation/or people, which would result in a cleaner environment.				

Tick YES or NO and where appropriate indicate remarks

	YES	NO	REMARKS
4.16 Do you cross lawn, flower beds, etc?			

4.17 D o you have an area, or plot to Sweep/keep tidy?

4.18 Do you clear weeds around homes to leave a bared land?

4.19 Do you have flower pots, trees, etc. to maintain in the house?

4.20 Do you plant trees to protect the school?

	YES	NO	REMARKS
4.21 Do you throw waste [e.g. banana, orange peels, etc.] into litter bins or in pit for solid waste disposal?			
4.22 Do you throw things (rubbish, pieces of paper etc.) about in the classroom or college compound?			
4.23 Do you cut trees indiscriminately in the garden, on school compound, etc?			
4.24 Do you consider the protection of wildlife in the forest reserves wicked act on the part of the government?			

4.25 Supposing you were to choose one of the following for use in your garden/farm to improve the soil fertility, which one would you consider to be the safest for your surrounding when used?

Ammonia Sulphate fertilizer [ ]

Compound fertilizer (N. P. K. 20-20-20) [ ]

Organic Manure (Poultry Manure) [ ]

APPENDIX B

INTERVIEW GUIDE FOR ENVIRONMENTAL EDUCATION TEACHERS

1. What are your academic and professional qualifications?

   Academic.....

   Professional.....

2. For how long have you taught EE?.....

3. How many classes do you teach EE?.....

4. What is the number of students in each class?

   .....

   .....

   .....

5. How many teaching periods do you have per week?.....

6. What teaching methods do you use?

		Very often	Often	Rarely	Never
a)	Lecture				
b)	Field trip				
c)	Practical				
d)	Demonstration				
e)	Discussion				
f)	Experimental				

g) State any other.....

7. Please, assign reasons for your responses to question 6.

.....

.....

.....

8a) Do you hold practical lessons with students?

a) Yes [ ] b) No [ ]

b) If yes, state how often and describe the nature of one of such lessons

.....

.....

.....

c) If no, why?.....

.....

.....

9. What form of assessment do you use?

	Very often	Often	Rarely	Never
a) Written tests on treated topics				
b) Oral tests on treated topics				
c) Practical test				
d) None of these				

e) State any other.....

APPENDIX C

REQUEST LETTER TO THE COLLEGE PRINCIPAL

7th October 2004

PERMISSION TO ADMINISTER QUESTIONNAIRES TO STUDENTS

As a partial fulfilment of requirements for the award of Master of Education Degree in Management by the University of Cape Coast, I am conducting a study on Environmental Education of Teacher Trainees.

It would therefore, be appreciated if you would permit me to gather data from some of the second and third year Social Studies students in your college, through questionnaires administration.

Thank you.

LEOCADIA ZAKPALA

THE PRINCIPAL

NJA TEACHER TRAINING COLLEGE

P O BOX 71

WA

UPPER WEST REGION