UNIVERSITY OF CAPE COAST

ENVIRONMENTAL ATTITUDE AND KNOWLEDGE OF PRESERVICE TEACHERS

A THESIS WORK PRESENTED TO THE DEPARTMENT OF SCIENCE EDUCATION UNIVERSITY OF CAPE COAST

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER OF PHILOSOPHY (M. PHIL.) DEGREE (SCIENCE EDUCATION).

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DEDICATION

I dedicate this work to God, my helper and provider, and also to my wife, Rose and
daughters:- Lovia and Sandra.

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This work was made possible through the immense contributions from a host of people to whom I am so much indebted.

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SUPERVISOR'S CERTIFICATION

We the undersigned supervisors hereby certify that the research embodied in this thesis,

ENVIRONMENTAL ATTITUDE AND KNOWLEDGE OF PRESERVICE TEACHERS.

was carried out by Owusu-Ansah, Gyarkye, and that it was supervised in accordance with the guidance on the supervision of thesis laid down by the University of Cape Coast.

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I hereby declare that the research embodied in this Thesis, ENVIRONMENTAL ATTITUDE AND KNOWLEDGE OF PRESERVICE TEACHERS, was carried out by me for the purpose of the award of Master of Philosophy (M. Phil.) Degree.

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ABSTRACT

This study was carried out to assess preservice teachers' environmental literacy. Two instruments were administered to 160 preservice teachers in four Teacher Training Colleges in the Ashanti Region of Ghana for the purpose of collecting data regarding the levels of :

(i) knowledge related to Environmental Education (EE) and

(ii) environmental attitude, which measures the degree of preference for, or objection to EE.

The sample for the study comprised 17% of the target population. Purposive sampling was used to select the preservice teachers who were involved in the study.

Split-half reliability coefficients showing the internal consistencies of the items were 0.75 for Environmental Knowledge Test (EKT), 0.84 for the attitude test and 0.90 for the two scales.

The data collected were analysed using both parametric and non-parametric methods. Specific statistical tools used to test the hypotheses were χ^2, ANOVA, Z-test and Fisher-t-test at significance level of 0.05. The findings of the study include the following:

1. Preservice Teachers have positive attitude and substantial environmental knowledge;
2. Female Preservice Teachers possessed not only a high environmental knowledge but also a more positive attitude towards EE than their male counterparts; and
3. Lastly, the study revealed that there was a positive correlation between preservice teachers' environmental attitude and knowledge.

In order to improve or maintain the standard set, it is being recommended that, teacher education must respond by providing appropriate course work and models for both preservice and in-service teachers.

CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND TO THE STUDY

The process of education depends on many factors for success. Such factors include good curricula, appropriate textbooks, functional audiovisual aids and adequate school buildings. Most important of all, it depends on people who, through their competencies, interpret the curricula and strive to achieve the goals, make use of the different facilities of the school building, give life to the visual aids and above all influence the behaviour of the students and help shape their lives. These people are the men and women who make teaching their profession, those who aid students in the development of understanding, skills and attitudes. Sound teacher education is therefore basic and vital for the development of any educational programme, especially in Environmental Education (EE) (UNESCO, 1975).

The need for EE was recognised by the International Agencies at the United Nations Conference on the Human Environment. Many EE authorities recommend that the subject should permeate all parts of the school curriculum. This will not happen unless teachers are trained to make it happen. Teachers

hold the key, at least, to that part of EE that takes place in formal education (UNESCO, 1977).

Given the immensity of the task to be accomplished and the limited resources available, it makes sense to place a major emphasis on the training of teachers in that, they directly or indirectly influence large number of students, pupils and the community in which they live (UNESCO, 1975).

One report which was reviewed by Emery , Davey and Milne (1973), showed that it is important not to over-emphasise environmental crises but to develop the attitude about continuing concern for the wise management of the environment.

In spite of the conferences and growing international involvement in EE, relatively little has been accomplished in the development of specific teacher education programmes with an environmental focus. Important as these efforts and achievements may be, there are still a number of gaps and shortcomings. Obviously, less seems to have been achieved at the secondary schools and Training Colleges, both quantitatively and in terms of innovations. Besides, there is a notable lack of scientific information on many aspects of the Ghanaian environment. This underscores the urgent need for long term environmental monitoring, to provide data for setting the policies and actions required to minimized environmental degradation.

There is also a disturbing lack of public awareness of environmental problems and their consequences for human survival (International Institute for Environment and Development (IIED), 1992; Draft Report, 1993).

It is worthy to note that, the key to developing effective training programmes for both prospective and practising teachers need a "working knowledge" of environmental science. Second, a grasp of educational methods, especially those techniques most suited to fostering students' discovery of environmental principles and clarification of environmental values is vital. Third, teacher training programmes should provide a supportive practical situation in which students have the opportunity to test and refine their developing reservoir of skills (UNESCO, 1975).

Stapp (1975) on his part, summarised the preservice teacher training requirements as follows:

> It is imperative that future teachers obtain training in the following areas; basic competencies in environmental science; theoretical education, instructional skills, and opportunities to combine the above competencies in closely supervised educational work-study programme prior to assuming a professional teaching career (p. 130).

His outline of desirable "Environmental Science competencies" reflects a vital factor in the preservice training of the EE teacher; that is, that such competency cannot be limited to the acquisition of natural science knowledge. All teachers of EE

must be provided with facts, laws, and conceptual tools to help them teach and integrate information about environmental problems and opportunities.

At the secondary level, the task of teacher training colleges is to help prospective teachers understand the basic concepts and principles that support the philosophy of living in harmony with and within our environment. Their task is also to develop attitudes and skills that are desirable for teachers of EE. Solutions to major environmental problems involve global understanding and strategies. To overcome these environmental problems, recommendations made at various workshops urged that there should be organisation of EE at all levels and for all categories of students with emphasis on environmental problems in the teaching of each discipline (UNESCO, 1977).

Most of the reports on EE reveal an emphasis on EE in small segments of relatively large university programmes with only a small portion of the students body affected. Environmental emphasis is mostly furnished by few dedicated faculty members, working within traditional departmental restraints. Thus, they are only able to cover effectively the field or discipline of their greatest expertise, usually some aspect of science. On a worldwide basis, we seem to be training only a few people to solve the multiple environmental problems caused by the vast majority of

citizens. If a true concern for man and his environment is to develop to the point where crises situations are not as common place as they are today, then we must reach a greater audience, not only all general secondary school students, but primary school pupils, the youth and adults as well (UNESCO, 1975).

Responding to concern regarding the quality of the environment, both in Ghana and the world at large, the Ministry of Education in conjunction with that of Environment, Science and Technology has begun to promote EE through the formal and non-formal educational systems (IIED), 1992).

While the need for EE. for students, teachers and administrators at all school levels has been seriously considered, little is known about their current knowledge, behaviour or attitudes. This information is beneficial for educators to improve actual teaching of EE at schools (Chi- Chin, 1993).

Several reasons focused this study on training college and preservice teachers' education. First preservice teachers are at an age of great pre-university development, both physically and psychologically. Secondly, since most preservice teachers are in their final stage of school learning and some may not pursue higher education, the EE received at this level will influence their development of knowledge, attitude and behaviour regarding the environment.

The successful implementation of the environmental Action Plan designed by the country depends, to a large extent, on the success of EE in the colleges and schools. This is because pupils can influence their parents to change their undesirable attitude towards the environment. More importantly, in Ghana children interact greatly with the environment and their activities often contribute to environmental problems like poor sanitation and bushfires. Children sometimes, dump refuse into uncompleted buildings and unauthorised places like gutters and fresh water systems. In the rural areas, the activities of the youth on farms, like hunting for rats with fire, sometimes cause bushfires. Furthermore, the children in schools today will in future, take responsibility for issues that require decision-making on the environment. Their education to understand the functioning of the environment and to develop healthy attitudes towards the environment is therefore imperative. Since teachers from the 3-Year Post-Secondary Teacher Training Colleges teach in the Basic schools, emphasis must be placed on their training to handle EE in the school efficiently.

As in many countries, Ghana faces environmental problems associated with gains in technological and industrial developments. It has become apparent that the public must be made aware of environmental problems and their devastating

effects. Teachers are traditionally charged with the responsibility of teaching EE all over the world, including Ghana. There is the hope that teachers who have the right attitudes and concern for environmental quality will be able to successfully implement EE programmes in schools (Mosothwane, 1991).

1.1 STATEMENT OF PROBLEM

Ghana is endowed with abundant natural resources which play very important roles in the agricultural and industrial development efforts of the country. However, in the process of exploiting these resources to meet the legitimate socio-economic aspirations of her people, adequate care has often not been taken to guard against the depletion of the resources (EPC, 1994).

Water, forest and mineral resources development projects bring in their wake questions of environmental problems, social disruptions and their education. Improper uses of hazardous chemicals in both agriculture and industry, create additional threats to human health and safety (EPC, 1994).

It is against this background that the public needs to be aware of environmental issues and their related consequences following the disharmonious nature man interacts with the environment. To address these negative impacts in a manner that

would not call for a halt to development efforts, the Government of Ghana initiated the preparation of the National Environmental Action Plan (NEAP).

Even in the midst of these strategic plans, there is still a big problem that needs to be solved by all. It appears that EE has never had a strong impact on the life of the citizenry.

This study aims at investigating preservice teachers' attitude towards EE. More specifically it was to find out whether preservice teachers have positive/high or negative/low attitude/knowledge towards EE. One of the aims of EE is to help the citizens possess the knowledge, attitudes, motivation, commitment and tools needed to work individually and collectively in order to solve current problems and prevent the emergence of new ones (UNESCO, 1977). A critical examination of the above aim indicates that, we have failed individually and collectively, in view of the new problems that emanate.

However, the success of any EE programme rests on teachers and would be realised only if they adopt positive attitudes towards its practice. If this all important ingredient is missing there is the likelihood that the procedure, laudable as it appears to be, may not achieve the objectives for which it has been introduced. A positive attitude and high knowledge in EE hold the key to a successful implementation of its programme. It

is also a fact that, the commitment of experts worldwide to the development of sound preservice teacher-training programmes in EE is clear. But to what extent has this concern been translated into actual programme in Ghana to train our teachers to become environmentally literate? Therefore, it is desirable to investigate the extent of knowledge and attitude, of preservice teachers with respect to EE. To achieve this objective, the study will address the following questions:

i. What are the attitudes of preservice teachers towards EE ?

ii. Do preservice teachers have the requisite environmental knowledge to impart on the pupils/students in the junior secondary schools?

iii. Is there any relationship between attitude and knowledge relevant to environmental issues held by preservice teachers?

1.2 THE PURPOSE OF THE STUDY

The study was to find out how preservice teachers perceive EE. This will lead the researcher to determine whether or not any significant difference exists in the perceptions/ attitudes of the different categories of preservice teachers in terms of gender and location of the colleges. Again, it aimed at ascertaining the current status of E.E. in the preservice teacher education programme in the Post Secondary Training Colleges in Ghana.

The study also investigated knowledge and attitudes of preservice teachers in relation to environmental issues in Ghana and the world at large. Generally, the study aimed at assessing preservice teachers environmental literacy.

1.3 HYPOTHESES

In the light of the problem and the purpose of the study, the following Null hypotheses were examined:

1. Preservice teachers do not have positive attitude towards EE.
2. There is no difference between male and female preservice teachers' attitude towards EE.
3. There is no difference between Urban and Rural preservice teachers' attitude towards EE.
4. There exists no difference between the opinions expressed by the preservice teachers on EE in the four colleges.
5. There is no difference between the environmental knowledge of male and female preservice teachers.
6. There is no difference between the environmental knowledge of rural and urban preservice teachers.
7. There is no relationship between preservice teachers' knowledge and attitude towards EE.
8. There is no difference in the environmental knowledge of the female preservice teachers' from the four colleges.

1.4 SIGNIFICANCE OF THE STUDY

The assessment of the attitudes of preservice teachers towards EE would serve as a feedback to educational policy makers as well as implementors and curriculum developers. This would enable them to develop the necessary strategies to strengthen positive attitudes and change existing negative attitudes towards EE.

Generally, the study would be helpful in updating research in the area of EE. Additionally, the research would provide school planning committees a valuable source of information about preservice teachers' interest, knowledge and attitudes in relation to environmental issues in Ghana.

1.5 DELIMITATION OF THE STUDY

The study was confined to the Ashanti Region of Ghana. It involved only final year students in four of the seven Post-Secondary Teacher Training Colleges in the region. The scope of the problem was limited to environmental issues such as; pollution from industrial and mining operations, land degradation, population issues, health, education, waste management (disposal), natural resources and conservation and general ecological concepts.

1.6 LIMITATION

The main limitation of this study was that, the sample used was made up of final year students in four of the seven Teacher Training Colleges in the Ashanti Region. The conclusions would therefore be limited by these factors and as such generalisations cannot cover all preservice teachers in the country.

Again, since the data were collected with questionnaires, the problem of bias, normally associated with all research, based on the use of questionnaires, could not be ruled out completely.

1.7 DEFINITION OF TERMS

For the purpose of the study, attitude towards EE is defined as a feeling for or against EE or strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.

Environmental Knowledge is the acquisition of basic understanding of the total environment and its associated problems.

Environmental Education can be classified into education about the environment and education for the environment. Education about the environment, concerns providing cognitive understanding including the developing of skills necessary to obtain this understanding, and education for the environment is

directed to environmental preservation or improvement (Lucas, 1979).

Preservice Teachers as used in the research work means students in the Post Secondary Teacher Training Colleges who may take teaching as profession on completing their course. Simply put, it means prospective teachers at the basic level of education.

Urban Community is defined as any settlement of 5,000 or more people with the bulk of the population engaged in secondary production (IIED, 1992).

Rural Community on the other hand is any settlement of 5,000 or less people with the bulk of the population engaged in primary production (IIED, 1992).

There is, however, little agreement from one country to another on the division between "Urban" and "Rural" segments of the population. In the Congo for instance, the rural population is that which has mainly agricultural occupations, while predominantly non-agricultural population in localities of less than 2,000 inhabitants is classified as "mixed" and the remainder in larger towns, as urban (Brass *et al*, 1968).

Environment: The total of everything that enables the systems to operate or simply, the part that deals with the relationship between all living things including people and their natural surroundings (Atsiatorme, 1992).

CHAPTER TWO

LITERATURE REVIEW

2.0 THE GENERAL OVERVIEW

This chapter presents a review and discussion of the literature. A search of the literature revealed that a considerable number of articles and studies having to do with attitudes and related to the learning of EE have appeared in the last couple of years. Some major studies, specifically pertaining to the attitude of preservice teachers towards EE have also been found. For the purpose of the study, the review would be broken into sub-headings, namely:

(a) Attitude theory
(b) Attitude and knowledge of preservice teachers with respect to EE
(c) Environmental Education in 3-Year Post-Secondary Teacher Training Colleges in Ghana and
(d) Summary of Literature review.

2.1 ATTITUDE THEORY

For many years, social psychologists have been debating the merits of various theories of attitude acquisition and change. There is still little agreement about what an attitude is, how it is formed, how it is changed, and what role it plays in influencing behaviour. It is therefore essential to give a general overview of

the most significant and widely held theories of attitude acquisition and change.

In any discussion of attitude theory it is necessary to clarify one's terminology. In this instance, four major concepts need definition: attitude, belief, behavioural intention, and behaviour. Attitude can be most appropriately defined as an organised structure of ideas with both affective and cognitive components, which results in some behavioural intent. It is the affective component that distinguishes attitude from other concepts. Attitude may be conceptualised as the amount of affect for or against some objects or situation (Thurstone, 1931; Fishbein and Ajzen, 1975).

Attitude theorists have consistently come up with the following trilogy to explain or define attitude: affect, cognition, and conation. Affect, refers to a person's feelings toward the evaluation of some person, object, issue, or event; cognition, denotes the persons knowledge, opinions, beliefs, and thoughts and conation refers to a person's behavioural intentions and actions. Obviously, attitude cannot be separated from knowledge. There is a widely held position that knowledge and education lead to attitudes which foster action aimed at the solution of problems. There is a circularity between attitudes and knowledge in that one does not solely cause or even precede the other, but rather

some knowledge may lead to initial information of attitudes which in turn lead to further gains in knowledge and so on. As summarised by Ramsey and Rickson (1976), increased knowledge leads to favourable attitude towards EE which in turn leads to action promoting better environmental policy making.

On the other hand, Fishbein and Ajzen (1975) found it necessary to distinguish behavioural intent from behaviour. This suggests a classificatory system based on four broad categories: affect (feelings); cognition (opinions, beliefs); conation (behavioural intentions); and behaviour (observed overt acts). "Attitude" will thus be used here for the first category; "beliefs" will be used for cognition category "behavioural intentions" will replace conation; and behaviour will represent a fourth category.

"Beliefs" can be defined as the information a person has about an object. More distinctly, a belief links an object to some attribute. An example would be the statement "pollution is harmful to health" where the object (pollution) is linked to the attribute (harmful to health). According to Fishbein and Ajzen (1975, p. 12), "the object of belief may be a person, a group of people, an institution, a behaviour, a policy, an event etc. and the associated attribute may be any object, trait, property, quality, characteristics, outcome or event".

The category of "behavioural intentions" refers to a person's intent to perform a specific behaviour. It can be viewed as a special case of beliefs in which the object is always a person and the attribute is always a behaviour.

"Behaviour" is self-explanatory; it means observable actions, which are generally studies in their own right. All questionnaires or verbal responses are instances of overt behaviour but they are often used to infer attitudes, beliefs, or intentions, as is done in this study.

In summarising these concepts, Fishbein and Ajzen (1975) point out that:

> The concept "attitude" should be used only when there is strong evidence that the measure employed places an individual on a bipolar affective dimension. When the measure places the individual on a dimension of subjective probability relating an object to an attribute, the label "belief" should be applied. When the probability dimension links the person to a behaviour, the concept "behavioural intention" should be used. Other concepts that have been employed in the attitude area appear to be subsumed under one or another of these three broad categories. For example, concepts like attraction value sentiment, valence, and utility all imply bipolar evaluation and may thus be subsumed under the category of "attitude". Similarly, opinion, knowledge, information, stereotype, etc. may all be viewed as beliefs held by an individual (p. 13).

The next subheading summarised some major theories of attitude acquisition, formation, change and attitude measurements.

2.1.1 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 attitudes are acquired. In other words, how evaluative responses become associated with given stimulus objects. One of the earliest applications of these learning principles to attitude theory was by Doob (1947). He viewed attitude as an unobservable response to an object that occured before or in the absence of any overt response. Doob (1947) emphasised that, a person first learns an implicit response to a given stimulus, then must learn to make the specific overt response 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 attitude) can be accounted for by instrumental learning. According to Doob, (1947) the entire mediating response (both process) constitutes the attitude. He distinguished between attitude and other types of response that are elicited by social relevant stimuli, that are socially significant to the person.

The reinforcement theory of attitude change has received its greatest input from Hovland, Janis and Kelly (1953) and other researchers at Yale. Their theory is based on the initial learning theories of Hull (1943) as modified by Doob (1947). In essence, the reinforcement theory states that attitude change results from learning through reinforcement.

According to Hovland, Janis and Kelly (1953), 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. Second, she/he must understand and comprehend its contents. Finally, in order for communication to be accepted, significant incentives must be present (Hovland, Janis and Kelly, 1953).

One of the main assertions of this theory is that attitude change occurs subsequent to opinion change. But the theory says very little about how this occurs or the reasons for it. Finally, there is very little explanation of how a persuasive communication supplies reinforcement for the advocated point of view.

2.1.2 OSGOOD AND TANNENBAUM'S CONGRUITY THEORY

The Congruity theory was developed by Osgood and Tannenbaum (1955) from prior work on the measurement of meaning using semantic space. The three-dimensional aspect of this space included activity (active - passive) evaluative (good-bad), and intensity (strong-weak) parameters. The theory of congruity merely says that when two attitude objects of differing evaluations are linked with an assertion each object tends to shift to a point of equilibrium or congruity. Attitude can be favourable (+), unfavourable (-), or neutral (o). As summarised by Sax (1974), "Attitudes are perceived to be along a negative - positive continuum". Similarly, assertions can be positive (associated in the Osgood and Tannenbaum Lexicon) or negative (dissociated). One of the main aspects of congruity theory is the notion that attitudes tend towards maximum simplicity. In other words, attitudes move (change) toward maximum polarisation on either positive or negative. Thus, the attitude object tends to be considered either all good or all bad (Caris, 1978).

2.1.3 ATTITUDE ASSESSMENT

Three procedures for eliciting opinions and attitudes have been used in opinion research and they warrant a brief description. The first method of attitude assessment is known as

the Thurstone Technique of Scaled Value (Thurstone and Chave, 1929). A number of statements, usually twenty or more, are gathered that express various points of view toward the attitude object (group, institution, idea or practice). They are then submitted to a panel of judges, each of whom arranges them in eleven groups ranging from one extreme to another in position. Through sorting by each judge, some items are discarded whilst others are retained. Those retained are given median scale value through which their opinions are scored or quantified.

The second method - The Likert Method of summated Ratings - can be performed without a panel of judges and yield scores very similar to that of the Thurstone method. The coefficient of correlation between the two scales has been reported to be as high as +0.92 in one study (Edward and Kenney, 1946). Since the Likert - type scale takes much less time to construct, it offers an interesting possibility for the student of opinion research (Best and Khan, 1989). The Likert -type Scale is usually based on three-point, four-point and five-point viz; agree, undecided, disagree or strongly agree, agree, disagree, strongly disagree, or strongly agree, agree, undecided, disagree and strongly disagree respectively. The simplest way to describe opinion is to indicate percentage responses for individual statement (Best and Khan, 1989).

The third method of attitude assessment, Semantic Differential, was developed by Osgood, Suci, and Tannenbaum (1957). The Semantic Differential is similar to the Likert Method in that the respondent indicates an attitude or opinion between two extreme choices. This method usually provides the individual with a seven-point scale with two adjectives at either end of the scale, such as good-bad, unhealthy-healthy, clean-dirty, where a respondent is asked to rate a group, individual, or object on each of these bipolar scales (Gay, 1987; Best and Khan, 1989).

2.2 ATTITUDE AND KNOWLEDGE OF PRESERVICE TEACHERS WITH RESPECT TO EE

Here, the researcher would look into some of the research findings of some previous work done in Environmental Education (EE). Firstly, the rationale behind this is to enable the researcher have adequate information about the topic on hand. Secondly, it would help the researcher compare the results. That is, whether it will confirm or refute the already published findings. Thirdly, it would afford the researcher the chance to assign some plausible reasons why the research findings confirm or refute existing findings and what suggestions to make.

Many studies have been undertaken by way of trying to find solutions to the problems in other countries. One study on

environmental knowledge, attitude and behaviour of preservice teachers in Taiwan (chi-chin, 1993) showed that:

(i) Students in rural teacher training colleges appeared to have the lowest level of environmental knowledge, attitude, awareness of environmental problems and verbal commitment.

(ii) Rural preservice teachers possessed less environmental knowledge than urban teachers.

(iii) It was however, established that older students outscored younger students, and girls tended to be more aware of environmental problems than boys.

(iv) The study further concluded that preservice teachers are no more aware of environmental problems than senior high students.

Mosothwane (1991), carried out a similar study on "preservice teachers' environmental knowledge, attitude towards EE and concern for environmental quality" to assess preservice teachers' environmental literacy in Botswana. His findings have indicated that there is low environmental literacy among preservice teachers. It was observed from the result of the study that, science educators will have a difficult task of designing appropriate environmental education programmes. It went on further to suggest that if colleges of education can develop stronger EE programmes, then preservice teachers will have the

opportunity to increase their environmental literacy which will help them promote environmental awareness among the public.

Another research by Jing-Shin (1993) on "Attitude and perceptions of preservice secondary school teachers in Taiwan", indicated that:

(i) Females' attitudes towards environment were more positive than males' attitudes.

(ii) Preservice secondary school teachers had substantial concern for environmental issues.

(iii) There was a positive correlation between the preservice secondary school teachers' views toward the environment and environmental education.

Sunal (1991) on the other hand reported that, rural schools were characterised by inadequate laboratory facilities, less competent science teachers, lack of student awareness of the outside world, and curriculum unrelated to students' needs. To solve the problem, it was suggested that, the effect of region probably can be minimised by identifying each region with its special needs in environmental education (Sunal, 1991). This could be done by enriching EE resources (including teachers in rural areas and empowering rural teachers to bring about the improvement of EE in rural schools. In addition, all teachers need to be updated on environmental knowledge and issues.

2.3 ENVIRONMENTAL EDUCATION IN 3-YEAR POST-SECONDARY TEACHER TRAINING COLLEGES IN GHANA

The Post-Secondary Teacher Training Colleges prepare students academically and professionally to teach in schools at the basic level. The course contents at the colleges however are more professionally oriented than academic. There are 38 of such colleges, each falling under one of two groups. While one group emphasises the teaching of Mathematics, Science and Technical Skills, the second group emphasizes the teaching of vocational skills. The two groups however have common core subjects which are studied by all teacher trainees. These subjects are: Education, Cultural Studies, Physical Education, English Language, Basic Science, Basic Mathematics, Ghanaian Language and Agricultural Science. Sixteen colleges fall under group 1, while the remaining twenty-two fall under group 2.

One of the basic objectives of education, is to help the youth understand the environment, adapt constructively to it and contribute towards its survival and development. Subsequently, every Ghanaian will be expected to use his knowledge in EE to live in harmony with nature by understanding how it works. This objective might have been derived probably from the implementation of the new reforms in 1987, even though the need for the reform was as far back as 1973. Incidentally public

concern about environmental degradation in Ghana climaxed during the long dry spell and raging bushfires of 1983. Ironically, this was the single environmental event that set the stage for a concerted national effort to check environmental degradation (EPC, 1988).

In 1988 therefore, the Government initiated the preparation of an Environmental Action plan (EAP) to purpose a strategy to address the key issues, including deforestation, deterioration in solid quality and better management of renewable natural resources. The Action Plan provided a framework for interventions deemed necessary to safeguard the environment. Environmental Education formed a major part of the plan. This was based on the fact that, the success of an environmental policy presupposes that all sections of the population understand the functioning of the environment and the problems thereof, and contribute to its protection and improvement (EPC, 1988).

To achieve the objectives set, a continuous and detailed educational programmes for EE at the basic and second cycle school levels have been prepared and adopted by the Ministry of Education in collaboration with the Ministry of Environment, Science and Technology and other agencies such as UNESCO. The introduction of E E in the schools took the form of incorporating environmental and allied themes in the curricula of certain

subjects in the colleges and schools. A survey conducted by the curriculum Unit of the Ministry of Education in 1991 revealed that, in the 3-Year Post-Secondary Teacher Training Colleges, the themes are mostly integrated in Social Studies, Basic Science and Agricultural Science (Atsiatorme, 1992).

Another survey that looked at the state of teaching of EE in 3-Year Post-Secondary Teacher Training Colleges has been conducted by Atsiatorme (1992). The major issues considered were:

(i) Adequacy of Environmental themes/topics incorporated in the syllabus of the colleges.
(ii) Adequacy of periods allocated to the teaching of the subjects with Environmental or allied themes.
(iii) The methods used by teachers to teach the themes and
(iv) Problems teachers face when teaching the themes in the 3-Year Post- Secondary School in Ghana. The results of the survey seem to suggest that there is the need to develop a comprehensive EE teaching guide for the teachers in the schools and colleges.

Environmental Education (EE) has one of its principal aims directed to the formation of attitudes. The achievement of this aim requires certain skills in teachers in fostering attitude formation and in most cases attitudes change from undesirable to desirable attitudes towards the environment. Consequently, the

way EE is taught in schools and colleges could border around these considerations. Most importantly,one of the cardinal goals for the incorporation of EE into the curricula of schools is that, the youth must be taught to identify their relationship with the environment and to interact with it. Implicitly, its objectives go beyond more knowledge and understanding to ability to act. In effect, EE teaching methods should stress on the achievement of objectives or generally towards the development of certain mental processes. Some of these have been identified as observing, comparing, discriminating, evaluating, decision-making, problem identification and measuring (UNESCO, 1983).

2.4 SUMMARY OF LITERATURE REVIEW

An attempt has been made to explore the relevant literature that would help the researcher to have broad knowledge on the topic. The following sub-headings were reviewed;

First, the concept of attitude and its related concepts have been reviewed. In addition, summaries of some major theories of attitude acquisition, formation, change and attitude measurements have been discussed.

The empirical evidences also show that:

(i) females' attitudes towards EE are more positive than males' attitudes.

(ii) rural preservice teachers have lower environmental knowledge and attitudes than their urban counterparts.

(iii) positive relationship exists between preservice teachers' attitude and knowledge.

(iv) there is low environmental literacy among preservice teachers

(v) little is known about preservice teachers' attitude and knowledge, behaviour or attitude towards EE in Ghana.

(vi) in the 3-Year Post-Secondary Teacher Training Colleges, the themes are mostly integrated in Social Studies, Basic Science and Agricultural Science. However, various suggestions have been offered as to how to promote E.E. in Ghana and the world at large.

On the whole,the review of the related literature on the subject of study has been very useful. The review has also shown that, little has been done in Ghana, so far as research on this topic is concerned. It has therefore contributed in no small way to make this work a reality and thereby fulfiling the desired need.

The literature has also revealed that biographical factors like sex, age, grade levels and location could influence the attitude and knowledge of preservice teachers. The evidences produced are not conclusive and they are subject to further verifications. And this is what this study seeks to do. More importantly, the studies that form the basis for these conclusions were conducted in certain specific places in the world on preservice teachers who

have different characteristics and different cultural influences when compared to those in Ghana. This study is therefore necessary to find out what prevails in Ghana so as to help improve educational practice in Ghana in particular and to contribute to educational theory in general.

CHAPTER THREE

METHODOLOGY

3.0 GENERAL OVERVIEW

This chapter describes the research design, the population and the sample used in the study. The research instruments used in the data collection, the procedure followed in collecting the data and methods of scoring and data analyses have also been described.

3.1 RESEARCH DESIGN

The study was essentially a survey of the attitude and knowledge of preservice teachers with respect to EE. It was a descriptive survey which primarily aimed at looking at the attitudes and knowledge of preservice teachers as they existed at the time the research was conducted. The design therefore involved collecting data from the selected sample through the administration of questionnaires concerning the current attitudes towards and knowledge of preservice teachers in EE and analysing the responses.

3.2 POPULATION

The target population for the study was the final year students in the 3-Year Post Secondary Teacher Training Colleges in Ghana. The study was limited to the final year preservice teachers, (students in the teacher training colleges), since they are at the terminal point in their programme and should have been adequately exposed to environmental issues/knowledge to begin their teaching careers. In view of the financial, material and time constraints, the accessible population was also limited to the final year teachers in four of the seven Post-Secondary Teacher Training Colleges in the Ashanti Region of Ghana. There are seven Teacher Training Colleges in the region, three for females only and the other four for both sexes (mixed). Two of the colleges are located in urban community, three in semi-urban communities and two in rural communities. The sizes of both the target and accessible populations were 964 and 668 respectively. The study was focused on rural and urban colleges, in line with the hypotheses set. The colleges used in the study were Wesley College (mixed), St. Louis Training College (female), in an urban community, Akrokeri Training College (mixed) and Agogo Presbyterian College (female), in rural communities.

The selection of respondents was done in such a way that, all other characteristics needed for the study were attended to, for

instance, gender, background (location of College) etc. The Ashanti Region was chosen for the study, due to the familiarity of the environment by the researcher. Besides, it is one of the regions with the highest number of training colleges and highest number of female Training Colleges.

3.3 SAMPLE

Purposive sampling was used to select a total of 160 preservice teachers for the study. In each of the mixed Teacher Training Colleges, 40 male preservice teachers were selected, whilst 20 females were selected in each of the four teacher training colleges. In this case, 80 females and 80 males were involved in the study.

The rationale behind the purposive sampling was to obtain equal representation of male and female in the study. Furthermore, to enable the researcher to build a sample that is satisfactory to his specific needs (Cohen and Manion, 1994).

Table 3.1 shows the distribution of the sample in terms of gender and location.

Table 3.1 The Distribution of Sample Used in the Study by College.

NAME OF COLLEGE SAMPLED	GENDER	LOCATION	NO.
WESLEY	MALE	URBAN	40
WESLEY	FEMALE	URBAN	20
ST. LOUIS	FEMALE	URBAN	20
AKROKERI	MALE	RURAL	40
AKROKERI	FEMALE	RURAL	20
AGOGO	FEMALE	RURAL	20
TOTAL			**160**

3.4 DATA COLLECTION TECHNIQUE

Data were collected using two main instruments, namely Environmental Attitude Test and Environmental Knowledge Test (EKT). A questionnaire was used for the collection of data on the level of environmental attitudes, which measures the degree of preference for, or objection to EE. The questionnaire developed to measure attitude was also broken into two sections. Section 'A' was for collection of personal data of respondents through closed ended items. Section 'B', on the other hand contained item of statements covering the variables based on the postulated hypotheses. The statements were designed to permit the use of the Likert scale. The Likert-type technique enables respondents

to indicate the degree of their belief in a given statement (Best and Khan, 1989). Hence this technique was chosen to measure the attitude of preservice teachers towards EE. The five - point scale, with the gradation strongly agree, agree, undecided, disagree and strongly agree, was chosen for the study for easy calculation of the cut-off point or neutral attitude.

Section 'B' of the questionnaire which measured the attitudes of preservice teachers was designed to yield a total score for each respondent. All statements that reflected positive direction or favoured the need for EE (eg, I have always liked EE) were given the following scale values:

	OPINION		SCALE VALUE
(a)	Strongly Agree	(SA)	5
(b)	Agree	(A)	4
(c)	Undecided	(U)	3
(d)	Disagree	(D)	2
(e)	Strongly Disagree	(SD)	1

On the other hand, those statements that have negative connotations or statements opposing the need for EE (eg. some topics in EE are not interesting) were also scored in the opposite

OPINION			SCALE VALUE
(a)	Strongly Agree	(SA)	1
(b)	Agree	(A)	2
(c)	Undecided	(U)	3
(d)	Disagree	(D)	4
(e)	Strongly Disagree	(SD)	5

Additionally, environmental Knowledge Test (EKT) was for collecting data on the level of knowledge related to environmental issues. Eight dimensions: General ecological concepts, population issues, health, education, domestic waste disposal, pollution from industrial and mining operations, land degradation and natural resources and conservation were followed as a blue print for developing the questions of both knowledge and attitude scales. These instruments were revised from scales developed by Caris (1978) in such a manner that would make the items suitable to the culture of Ghana. To get the views expressed by respondents on environmental issues, the EKT was broken into two main sections, the first part comprising multiple choice questions and the second part open-ended questions. (See Appendix A).

3.5 VALIDITY AND RELIABILITY OF INSTRUMENTS

To ensure the content validity of the instruments used for the study, prepared items were given to three educationists and an officer from the Environmental Protection Agency (EPA) to read through, since this is determined by expert judgement (Gay,

1987; Borg and Gall, 1989). The suggestions received from the experts were used to restructure the items appropriately. Apart from this, a pilot study was conducted which enabled the researcher to revise the items in the questionnaire. Twenty respondents were used, and the data collected were used to calculate the reliability coefficient of the two instruments. Split-half reliability coefficients showing, the internal consistencies of the items computed were 0.75 for EKT, 0.84 for the atitude test and 0.90 for the two scales.

3.6 DATA COLLECTION PROCEDURE

The questionnaires were hand-delivered by the researcher. In each of the chosen colleges, the selected subjects were put in one classroom with the help of the Vice-Principal, and the questionnaires were administered to them. The completed questionnaires were then collected for analysis.

Out of the 160 questionnaires that were distributed and collected by the researcher, 147 were accepted whilst 13 were rejected because they were partially answered. This made it impossible for the researcher to work with them. On the whole, 93% of the questionnaire was accepted whilst 7% was rejected. Table 3.2 shows the distribution of questionnaire sent out and accepted for the study.

Table 3.2 **The Distribution of Questionnaire by Colleges**

NAME OF COLLEGE	QUESTIONNAIRE SENT OUT	QUESTIONNAIRE. ACCEPTED	% QUESTIONNAIRE ACCEPTED
WESLEY	40	36	90.0%
WESLEY	20	18	90.0%
ST. LOUIS	20	19	95.0%
AKROKERI	40	37	95.5%
AKROKERI	20	18	90.0%
AGOGO	20	19	95.0%
TOTAL	**160**	**147**	**93%**

3.7 SCORING AND ANALYSIS

The collected data were statistically analysed. Both descriptive as well as inferential statistics were used. To facilitate easy identification, the questionnaires returned by the subjects were given serial numbers. Using the raw attitude scores of the respondents, the overall cut-off point (neutral attitude) was computed to be 201 after finding the weighted values of each respondent's score. This value served as the cut-off point between negative and positive attitudes on the attitude scale. Theoretically, the raw scores for individual preservice teachers fell between 67 and 335 because as stated by Best and Khan (1989), if an opinionnaire consisted of 67 items, the following scores values would be revealing:

67 x 5 = 335 (most favourable/positive).

67 x 3 = 201 (A neutral attitude).

67 x 1 = 67 (most unfavourable/negative attitude).

On the part of the Environmental Knowledge Test (EKT), the open-ended questions were coded before scoring was done. In the multiple choice items, correct response scored one mark whilst wrong response scored zero. On the other hand the open ended coding order was 2, 1, 0. That is, 2 for correct response, 1 for partially correct response and zero for incorrect response. Here, the cut-off point was taken to be 50, since the total mark was 100 and 50 seemed to be the median score on the Environmental Knowledge scale.

The main statistical tools that were applied in testing the hypotheses were the chi-square test (X^2), Z-test, Fisher-t-test and the Analysis of Variance (ANOVA). The 0.05 level of significance was also used. The chi-square (X^2) was deemed appropriate to test most of the hypotheses set, due to its non-parametric nature. This is because, the data for the attitude test was categorical and based on frequency count, so it did not require the assumption of normal distribution like Z-test or other parametric test (Mangal, 1993). Lastly, the chi-square (X^2) was preferred to the Mann-Whitney test, since the data for the

attitude test were not expressed in ordinal scale values but rather expressed in nominal scale values (Best and Khan, 1989).

On the other hand, the EKT was analysed with Z-test at a significance level of 0.05 after the means and standard deviations for the various variables had been computed. The Z-test was preferred to the t-test in comparing the means computed, in that the subjects involved in the aforementioned hypotheses were more than 30. Here, a parametric test was used for the EKT since it was based on interval scale, and data collected were measured and assumed to be normally distributed (Gay,1987).

In testing whether there existed relationship between attitude and knowledge of preservice teachers, the Rank Difference Method was used to compute the rank correlation coefficient (r) whose value was later tested for its significan : using the formula developed by

Fisher (1915) viz; $$t = r \sqrt{\frac{N - 2}{1 - r^2}}$$

where t = t-ratio

r = correlation coefficient

N= sample size (Mangal, 1993 p. 139)

Lastly, the Analysis of variance (ANOVA) was used to test whether there was significant difference between the mean marks in EKT of the female preservice teachers in all the four colleges.

The ANOVA was selected for this, because the significance of differences between more than two means were being determined.

CHAPTER FOUR

RESULTS AND ANALYSIS OF THE STUDY

4.0 GENERAL OVERVIEW

This chapter presents the results and analysis of the study. Data presentations, statistical analysis with summaries of results were done using the minitab statistical software.

4.1 MAIN ANALYSIS OF DATA

The main analysis of the data and the tabulated results have been presented hypothesis by hypothesis. In the process of hypothesis testing, the test statistic was clearly stated, followed by the decision taken by the researcher and tabular presentation of data.

4.1.1 HYPOTHESIS 1

It was hypothesised that:

Ho: Preservice teachers do not have a positive attitude towards EE.

H1: Preservice teachers have a positive attitude towards EE.

In Table 4.1, the distribution shown was tested using X^2 test of goodness of fit. Yates correction formula was applied in the testing, because of the one degree of freedom shown in the data. The calculated X^2 of 26.01 was greater than the tabulated X^2 value of 3.84 at one degree of freedom and level of significance

0.05. The researcher therefore failed to accept the null hypothesis. Hence the X^2 test showed significant difference between those who possess positive and negative attitudes towards EE as presented in Table 4.1. Obviously, it was noticed that preservice teachers' attitudes towards EE were positive.

Table 4.1 Frequency and Percentage Distribution of Preservice Teachers' Attitude Towards EE

CATEGORY	NO. OF FREQUENCY	PERCENTAGE (%)
POSITIVE	112	76
NEGATIVE	35	24
TOTAL	147	100

N = 147, X^2 = 26.01, df = 1, * P< 0.05, * Significant

4.1.2 HYPOTHESIS 2

It was hypothesised that:

Ho: There is no difference between male and female preservice teachers' attitude towards EE.

H1: There is a difference between male and female preservice teachers' attitude towards EE.

The distribution shown in Table 4.2. was tested using X^2 test of independence. The calculated X^2 value of 10.146 was greater than the tabulated (critical) X^2 value of 9.488 at four degrees of freedom and level of significance of 0.05. The researcher failed to accept the null hypothesis. This result implies that differences exist in the attitudes of the preservice teachers in terms of sex as presented in Table 4.2.

Table 4.2 **Frequency and Percentage Distribution of Attitudes Towards EE by Sex**

GENDER	OPINIONS / RESPONSES					
	S. A.	A	U	D	SD	TOTALS
MALE	20.00 (1190)	26.00 (1582)	27.00 (324)	16.00 (892)	11.00 (632)	100.00 (4560)
FEMALE	25.00 (1164)	36.00 (1655)	10.00 (461)	16.00 (732)	13.00 (581)	100.00 (4593)
TOTAL	**45.00 (2354)**	**62.00 (3177)**	**37.00 (785)**	**32.00 (1624)**	**24.00 (1213)**	**200.00 (9153)**

N=147, X^2 = 10.150, P<0.05, df = 4, *Significant, ( ) = Frequency of responses.

The results in Table 4.3 also support the above assertion, in that whilst 77% of females obtained scores higher than the cut-off point, 75% of the males scored above the cut-off point on the attitude scale.

Table 4.3 **Frequency and Percentage Distribution of Preservice Teachers' Environmental Attitude by Sex**

GENDER	ATTITUDE (%)		TOTAL NO OF RESPONDENT (%)
	POSITIVE	NEGATIVE	
MALE	75	25	**100**
	(54)	(18)	**(72)**
FEMALE	77	23	**100**
	(58)	(17)	**(75)**

( ) = Frequency of responses.

4.1.3 HYPOTHESES 3.

Ho: There is no difference between urban and rural preservice teachers' attitude towards EE.

H1: There is a difference between urban and rural preservice teachers' attitude towards EE

The X^2 test of independence was used to test the data in Table 4.4. The result indicated that the calculated X^2-value of 1.40 was less than the tabulated X^2 - value of 9.488 at degrees of freedom of four and level of significance 0.05. Similarly, in Table 4.5, the test for goodness of fit was used, with the application of Yates correction formula. Here, the calculated X^2 of 0.86 was also less than the tabulated (critical) value of 3.84 at one degree of freedom and level of significance 0.05. In both situations, the researcher was not able to reject the null hypothesis. This shows that there was no statistically significant difference between the urban and the rural preservice teachers.

Table 4.4 **Distribution of Final Year Preservice Teachers Attitude Towards EE**

LOCATION	OPINIONS /RESPONSES					
	S.A.	A.	U.	D.	S.D.	TOTAL
URBAN	27.00 (1160)	28.00 (1474)	12.00 (454)	19.00 (742)	14.00 (569)	100.00 (4399)
RURAL	24.00 (1194)	35.00 (1703)	9.00 (331)	18.00 (882)	14.00 (644)	100.0 (4754)
TOTAL	**51.00 (2354)**	**63.00 (3177)**	**21.00 (785)**	**37.00 (1624)**	**28.00 (1213)**	**200.00 (9153)**

N = 147, X^2 = 1.410, df = 4, *P< 0.05 * Not Significant

Table 4.5 **Frequency and Percentage Distribution of Preservice Teachers' Attitude Towards FE by Location**

LOCATION	ATTITUDE (%)		NO. OF RESPONDENT (%)
	POSITIVE	NEGATIVE	
URBAN	79	21	100
	(55)	(15)	(70)
RURAL	74	26	10
	(57)	(20)	(77)

N = 147, X^2 = 0.86, df = 1, * P < 0.05, *Not Significant

4.1.4 HYPOTHESIS 4

Ho: There exists no difference between the opinions expressed by the preservice teachers in the four colleges.

H1: There is a significant difference in the opinions expressed by the preservice teachers in the four colleges.

In testing whether opinions, expressed by the preservice teachers were quite independent of college attended, the data in Table 4.6 was tested using X^2 test of independence. The calculated value of X^2 of 2.44 was less than the expected (tabulated) X^2 - value of 18.55 at 12 degrees of freedom and 0.05 level of significance. The result implies that, the opinions expressed were not dependent of the kind of college attended by respondents or simply no significant differences exist between the opinions expressed by the preservice teachers in the four colleges selected for the study.

Table 4.6 **Frequency and Percentage Distribution of Attitude Towards Environmental Education.**

COLLEGE	OPINIONS/RESPONSES					
	S.A	A	U	D	S.D.	TOTAL
A	26.00 (276)	32.00 (333)	11.00 (142)	18.00 (149)	13.00 (126)	100.00 (1026)
B	21.00 (300)	40.00 (476)	10.00 (11)	16.00 (191)	13.00 (157)	100.00 (1235)
C	25.00 (288)	36.00 (427)	10.00 (116)	16.00 (192)	13.00 (160)	100.00 (1183)
D	24.00 (300)	35.00 (419)	8.00 (85)	19.00 (207)	14.00 (138)	100.00 (1149)
TOTAL	**96.00** **(1164)**	**143.00** **(1655)**	**39.00** **(461)**	**69.00** **(732)**	**53.00** **(581)**	**400.00** **(4593)**

N = 147, X^2 = 2.44 df = 12, P < 0.05, *Not Significant.
A = WESLEY, B = ST. LOUIS, C = AGOGO, D = AKROKERI.

4.1.5 HYPOTHESIS 5

Ho: There is no difference between the environmental knowledge of male and female preservice teachers.

H1: There is a difference between the environmental knowledge between male and female preservice teachers.

As seen from Table 4.7, the differences in environmental knowledge between male and female preservice teachers were tested by the Z- test. The two-tailed test was used to determine the significance of the difference between the two means calculated from the environmental knowledge test scores.

Here, the calculated Z- score of 2.60 was greater than the tabulated Z-score of ±1.96 at significance level of 0.05. Therefore, the researcher failed to accept the null hypothesis. This implies that there was a significant difference between the mean scores of

the females and the male preservice teachers with respect to their knowledge on EE as presented in table 4.7.

Table 4.7 **Comparison Between Female and Male Preservice Teachers' Environmental Knowledge.**

GENDER	n	Mean	SD	Z-Cal	Z-tab	p
MALES	73	47.69	20.04	2.60*	±1.96	0.05
FEMALES	74	55.43	15.74			
TOTAL	147					

N = 147, Z = 2.60, P < 0.05. * Significant.

4.1.6 HYPOTHESIS 6

Ho: There is no difference between the environmental knowledge of rural and urban preservice teachers.

H1: There is a difference between the environmental knowledge of rural and urban preservice teachers.

The scores obtained for urban and rural preservice teachers from the environmental knowledge test were also statistically tested using the Z-test at 0.05 level of significance. The calculated Z-score of 2.31 was greater than the tabulated Z-score of ±1.96 (two-tailed) at significance level of 0.05. Therefore, the researcher rejected the null hypothesis. The results presented in Table 4.8 reveal that there was significant difference in the environmental knowledge of the two groups of preservice teachers, when the two means were tested statistically.

Table 4.8 **Comparism Between Urban and Rural Preservice Teachers' Environmental Knowledge.**

LOCATION	n	Mean	SD	Z-cal	Z-tab	P
URBAN	70	48.81	14.41	*2.31	±1.96	0.05
RURAL	77	59.73	11.43			

N = 174, Z = 2.31, P < 0.05 *Signigicant

4.1.7 HYPOTHESIS 7

Ho: There is no relationship between preservice teachers' environmental knowledge and attitude.

H1: There exists a relationship between preservice teachers' environmental knowledge and attitude.

The relationship between the environmental knowledge and attitude was tested statistically, using the Fisher-t-test after the correlation coefficient (r) had been calculated. As could be seen from Table 4.9, at 0.05 level of significance and degrees of freedom of 145, the calculated t-value of 0.36 was less than the tabulated t-value of 1.98. The researcher, therefore failed to reject the null hypothesis. As the rank correlation coefficient of 0.03 indicates, there is a positive relationship between the environmental attitudes and knowledge of preservice teachers, but may be interpreted as "slight and almost negligible relations" (Mangal, 1993; Cohen and Manion, 1994). Even though, there exist positive relationship between the two dependent variables

(environmental knowledge and attitude), the (r)-value of 0.03 was not significant (see table 4.9).

Table 4.9 Relationship Between Knowledge and Attitude with Respect to E E

r	t-cal	t-tab	(N-2)	p
0.03	0 . 36*	1.98	145	0.05

N = 147, t-cal = 0 . 36, df = 145, *P<0.05 * Not Significant

4.1.8 HYPOTHESIS 8

Ho: There is no significant difference between the female preservice teachers' environmental knowledge in the four colleges

H1: There is a significant difference between the female preservice teachers' environmental knowledge in the four colleges.

The Analysis of Variance (ANOVA) performed on the Environmental knowledge scores of the female preservice teachers in the four colleges is shown in Table 4.10. The calculated F-ratio of 216.82 was greater than the critical value of 2.74 at degrees of freedom (3,70) and level of significance 0.05 Therefore, the researcher failed to accept the null hypothesis. This is an indication that, there was a significant difference in the environmental knowledge of the preservice teachers on the basis of their colleges. This is confirmed by the mean (%)scores in

environmental knowledge of the different colleges as presented in Table 4.11.

Table 4.10 Comparison of the Environmental Knowledge of Female Preservice Teachers in the Four Teacher Training Colleges

SOURCE OF VARIATION	DEGREE OF FREEDOM (DF)	SUM OF SQUARES (SS)	MEAN SQUARE (MS)	F-ratio
Between Groups	3.0	57726.8	19242.3	216.82*
Within Groups	70.0	6478.5	88.7	
TOTALS	**73.0**	**64205. 3**	--	

F (3,70) = 216.82, P<0.05 * Significant

Table 4.11 Percentage Mean Scores of Female Preservice Teachers in the Environmental Knowledge Test

COLLEGES	n	MEAN %	STANDARD DEVIATION (SD)
A_F	18	64.42	8.29
B_F	19	60.00	7.23
C_F	19	65.25	11.33
D_F	18	60.32	10.17

A_F = WESLEY COLLEGE B_F = ST. LOUIS.

C_F = AGOGO D_F = AKROKERI

CHAPTER FIVE

DISCUSSION, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 GENERAL OVERVIEW

In this chapter, data obtained from the questionnaire and the results of the statistical analyses are discussed. This is followed by summary, conclusions and recommendations. However, the discussion has been broken down into two sections, viz, the general attitude of preservice teachers towards EE and the general knowledge of preservice teachers in E E.

5.1 THE GENERAL ATTITUDE OF PRESERVICE TEACHERS TOWARDS EE

The main thrust of the study was to find out the attitudes of preservice teachers towards EE and to determine whether differences exist between their attitudes in terms of sex and location. A series of statements (usually simple sentences) were presented to respondents in the questionnaire sent out, which formed the attitude scale. The number of favourable statements the respondents agreed with and the unfavourable statements he or she disagreed with were graded according to the Likert scale and the weighted values computed. Using the raw attitude scores of the respondents, the over all cut-off point was also computed

which served as a point between negative and positive attitudes as described in chapter three.

Out of the 147 respondents, 112 (76%) were on the positive side of the scale while the remaining 35 (24%) fell on the negative side of the scale. Furthermore, from the results, only sex and location of preservice teachers were assessed with the dependent variables attitude and knowledge) in relation to EE. Among the 147 preservice teachers, whose questionnaires were analysed, there were 72 males (49%), 75 females (51%), 70 urban (48%) and 77 were from rural areas (52%) participating in the study.

The results of the study are discussed below under the eight hypotheses posed at the beginning of the study.

5.1.1 HYPOTHESIS 1

Preservice teachers do not have positive attitudes towards EE.

Out of the 147 respondents, 112 (76%) were on the positive side of the scale while the remaining 35 (24%) fell on the negative side of the scale. However, the number of preservice teachers in the two categories (negative and positive continuum) was tested using X^2 test of goodness of fit, with the application of Yates correction formula, at one degree of freedom.

From the results in Table 4.1, the calculated X^2 - value of 26.01 was greater than the tabulated X^2 - value of 3.34 at 0.05 level of significance and one degree of freedom. The researcher therefore rejected the null hypothesis. The X^2 -test shows significant difference between those who possess positive and negative attitudes towards EE. Again, the results in Table 4.1 show positiveness of the attitude of the preservice teachers. Thus, the preservice teachers under study have positive attitude towards EE. This finding confirms that of Jing-shin (1993) on attitude of preservice teachers in Taiwan which indicated that preservice teachers have positive attitudes towards EE. However, it refutes the findings of Chi-chin (1993), which also showed that preservice teachers have low environmental attitudes.

The positiveness of the attitudes of the preservice teachers in the current study might have been attained due to the high level of environmental education campaign or programmes that have been mounted by the Ministry of Environment, Science and Technology in conjunction with the Ministry of Education in the media. Besides, the involvement of EE themes in the syllabus of the Post Secondary Teacher Training Colleges since the inception of the reform programmes, might also be a contributory factor (Atsiatorme, 1992).

5.1.2 HYPOTHESIS 2

There is no difference between male and female preservice teachers' attitudes towards EE.

In Table 4.2, the responses of preservice teachers in terms of sex, were tested using X^2 test of independence at significance level of 0.05 and degrees of freedom of four. It was observed that, the calculated X^2 -value of 10.146 was more than the critical X^2 -value of 9.488. The researcher therefore rejected the null hypothesis. The implication is that, there was significant difference between the male and female preservice teachers' attitude towards EE.

This finding supports the assertion made by both Jing-shin (1993) and Chi-Chin (1993) that females' attitudes towards EE are more positive than their male counterparts, as females tend to have more positive environmental attitudes than males in the study.

5.1.3 HYPOTHESIS 3

There is no difference between urban and rural preservice teachers attitude towards EE.

In Table 4.4, the X^2 test of independence was used to analyse the data. The calculated X^2 of 1.410 was less than the

critical X^2-value of 9.488 at 0.05 level of significance and degrees of freedom of four. On the other hand, in Table 4.5, the X^2 test of goodness of fit was used. Here, Yates correction formula was applied because of the one degree of freedom. The calculated X^2 value of 0.86 was less than the critical X^2-value of 4.84 at 0.05 level of significance and one degree of freedom. In both situations, the researcher was not able to reject the null hypothesis.

On whether preservice teachers in both rural and urban have different attitudes towards EE, the analysis of the attitude score, based on location indicates that, no significant difference existed between the two groups. In comparing the results in Table 4.5, more urban preservice teachers (79%) scored marks higher than the cut-off point, compared to their rural counterparts (74%) on the attitude scale, but this difference was not statistically significant when the two scores were tested. Although Chi-Chin (1993) has indicated that urban preservice teachers have more positive attitude towards EE than their rural counterparts, results in the current research showed the contrary.

5.1.4 HYPOTHESIS 4

There exists no difference between the opinions expressed by the preservice teachers in the four colleges.

As tested by X^2 test of independence at 0.05 level of significance and 12 degrees of freedom, the calculated X^2-value of 2.44 was less than the critical X^2-value of 18.55. The null hypothesis was therefore not rejected.

Table 4.6 compared the opinions of the preservice Teachers in the four colleges in relation to their attitudes towards EE. As the null hypothesis was not rejected, the implications is that, opinions of the preservice teachers in the different colleges did not differ. Upon the basis of acceptance of the hypothesis, one could easily infer that differences that exist in the raw scores were not significant. The observation was substantiated by the computed mean attitude scores of 212, 214, 213 and 202 for the affected colleges. That no difference was found in the opinions of the preservice teachers in the four colleges is an indication of the success of the teachers and environmental agencies in the country in their campaign for positive attitude towards EE. Preservice teachers in the country use the same curriculum for their training, therefore they have all been exposed to the environmental themes. This may also account for the finding.

5.2 THE GENERAL KNOWLEDGE OF PRESERVICE TEACHERS IN EE

5.2.1HYPOTHESIS 5

There is no difference between the environmental knowledge of male and female preservice teachers.

In analysing this hypothesis, the mean knowledge scores of the males and females were found to be 47.69 and 55.43 respectively (see Table 4.7). The Z-test was used to compare the two means in the two categories and tested for their significance at the level of 0.05. The Z-test of the two sample case was used because of the large size of the two groups. The calculated Z-value of 2.60 was greater than the critical Z-value of 1.96 at the level of significance given above. Hence, the researcher rejected the null hypothesis. This implies the difference between the two means (females and males) were significant. Obviously the percentage mean scores presented in Table 4.7, indicated that female preservice teachers have higher environmental knowledge than their male counterparts.

Females more positive attitude and high environmental knowledge may result from traditional education and its effect, and innate behaviour of maintaining personal hygiene. Obviously, females' predisposition towards EE and its practices are seen mostly in the household chores as washing and cleaning

the immediate surroundings. Traditionally, females will be adding these to their responsibilities whilst males look on unconcern. This might be one of the factors that accounted for females outscoring their male counterparts in this study. Crider, *et al* (1983), (quoted by Amedahe) has found that, if one's attitude changes, other logically connected attitudes change as well. This could probably explain why female and male preservice teachers differed in their environmental knowledge and attitudes as they may have different predispositions towards the environment.

Another plausible explanation seems to rest on the way females are influenced by personal hygiene. Females are always alert to maintain this tendency of being conscious of themselves and maintaining personal hygiene to the highest level. This inherent behaviour coupled with periodic experiences, like menstruation might also be a major contributory factor in influencing females attitudes towards EE. In contrast, their male counterparts do not possess these personal qualities or are not very actively involved in such traditional education, hence their comparatively low environmental knowledge and less positive attitude. Such a conclusion has support from social psychologists that attitudes are not innate and sex-specific but rather depend upon human motivation and learning. If both male and female

preservice teachers are exposed equally to a procedure and motivated equally to carry it out, there should be no marked difference in their attitudes or knowledge towards the procedure (Amedahe, 1994).

5.2.2 HYPOTHESIS 6

There is no difference between the environmental knowledge of rural and urban preservice teachers.

The Z-test was used to examine the possible differences between the category of preservice teachers. Since the calculated Z-value of 2.32 falls beyond the critical value of ± 1.96 the difference was significant. The null hypothesis was therefore rejected. This shows that regional differences existed among the preservice teachers' environmental knowledge. A cursory look at Table 4.8 reveals that rural preservice teachers mean scores (%) of 59.73 is higher than their urban counterparts of 48.81. Cui-Chin (1993) observed that the rural preservice teachers possessed less environmental knowledge than urban preservice, but the current findings showed the contrary. Rural preservice teachers possessing a higher level of environmental knowledge may be explained as a result of numerous resources and stimuli available in their surroundings.

Actually, most of the environmental issues in Ghana are rural based, for instance, issues like: bushfires, afforestations, deafforestation, pollution from mining activities and environmental degradation are targeted more to the rural communities. For example, most of the EE campaigns or programmes are inaugurated in the rural areas. Following the persistent education on the need to live in harmony with the environment, high communal spirits, formation of bushfires watch dogs and wildlife clubs and other environmentally related clubs are prevalent in the rural areas. The involvement of the youth in such clubs might have inculcated environmental discipline in them, thereby heightening their knowledge of environmental issues. These factors may contribute to the difference in performance in EE between urban and rural preservice teachers.

5.2.3 HYPOTHESIS 7

There is no relationship between preservice teachers' environmental knowledge and attitude.

The relationship between environmental attitudes and knowledge of preservice teachers was determined by calculating the coefficient (r) of the two sets of scores. As shown in Table 4.9, the correlation coefficient (r) was 0.03. Fisher-t-test was however used to test the significance of (r) and the results shown

in Table 4.9. Table 4.9 revealed that the t-calculated was less than the t-tabulated at 0.05 level of significance, and 145 degrees of freedom.. This enabled the researcher to accept the null hypothesis. The implication is that even though, there existed a positive correlation (r = 0.03) between preservice teachers' environmental knowledge and attitudes, it was not significant. According to Mangal (1993), Cohen and Manion (1994), r-value of 0.03 may be interpreted as slight and almost negligible relations. Based on the statistical analysis of the hypothesis, the correlation between environmental attitude and knowledge was therefore not significant. However, this finding is confirms that of Ramsey (1976) and Rickson (1976), who established a positive relationship between environmental attitude and knowledge. As Ramsey and Rickson, (1976) put it, increased knowledge leads to favourable attitude toward EE which in turn leads to action promoting better environmental policy making. Similarly Chi-Chin (1993) asserts that, no signifcant differences existed between preservice teachers' environmental knowledge and attitude.

5.2.4 HYPOTHESIS 8

There is no difference between the female preservice teachers' environmental knowledge in the four colleges.

The last hypothesis centered on whether there were variations in the environmental knowledge of the preservice teachers in the four teacher training colleges. The result of the Analysis of variance in Table 4.1.0 indicated that, the calculated F-ratio of 216.82 was greater than the tabulated F-ratio of 2.74 at 0.05 level of significance and (3,70) degrees of freedom. This called for a rejection of the null hypothesis by the researcher. It indicated that there was a significant difference in the environmental knowledge of preservice teachers in the four colleges as shown by the mean scores in Table 4.11.

5.3 GENERAL DISCUSSIONS

The aforementioned results indicated that preservice teachers in the four Post Secondary Teacher Training Colleges in the Ashanti Region had positive environmental attitude and high knowledge. All the sub-samples within the sample in terms of sex and location show positive attitude and high knowledge with respect to EE.

The positive attitude and high environmental knowledge of preservice teachers are signs of a good beginning for any EE programmes in the country. Perhaps, this positiveness stemmed from the persistent EE programmes usually mounted by the Ministry of Environment, Science and Technology which are

always covered by the mass media. Another plausible explanation, is the in-service training organised by the Ministry of Education in conjunction with the Ghana Education Service (GES) at the wake of the implementation of the new syllabus or specifically the educational reforms. It would be recalled that the National Teacher Training Council organised a four day workshop for all Agricultural Science Teachers from the Colleges from 25th to 29th of August, 1992. Again, the Ghana Association of Science Teachers (GAST) organised a national conference for its members from 31st August to 3rd September, 1992 to help train their student-teachers to develop positive attitude as well as high environmental knowledge.

However, despite the positiveness of the attitude of the preservice teachers, the intensity of the attitudes exhibited was not strong enough. This was indicated by the overall cut-off point of 201 on the attitude scale. The distribution on the attitude scale ranges from 67 to 335. The more the item mean score of respondents approached 335, the more positive their attitude would be. Clearly, the raw scores of respondents were closer to the cut-off point than the maximum score of 335. This is an indication that, the present over-all attitude of the preservice teachers in the study was not too high. Thus, the present attitude of preservice teachers could easily be slackened and slip into

negativeness, if difficulties are encountered in implementing EE programmes in Ghana. Lack of motivation on the part of the teachers who train them, short duration of periods during lesson time (usually 40 minutes), lack of laison between teachers who teach EE and lack of teaching/learning materials and teaching skills are some of the major difficulties that may be encountered. It is said that "attitude once formed may remain fairly stable" (Akpan, 1992). The foregoing point is relevant because as Russel (1984) puts it, behaviours that are motivated by weak attitudes can be thwarted by obstacles that seem to have little resistance, but where the attitude is strong, obstacles can be confronted and overcome.

It is true that attitude formed can be modified or changed. Major factors in attitude formation and change are social, cognitive and behavioural influences (Halloran, 1967, Hovland, Janis and Kelly, 1953). The present attitude of preservice teachers towards EE can be modified or changed to make it more positive. Using the cognitive influence approach, the rationale and the concomitant benefits of the practice to the educational system as a whole should be made known to the preservice teachers through in-service training programmes. The social influence in attitude change would be put in place as teachers attend courses, discuss and interact among themselves

regarding the need to develop positive attitude and acquisition because, to a large extent, the attitude of an individual depends upon the attitude and norms of the groups which form his frame of reference (Halloran 1967). The regularity of the in-service training courses should be emphasized here because, repeating a message a few more times in novel ways tends to increase its effectiveness. Probably, taking a look at, and improving the conditions of service of teachers may also contribute to the development of a more positive attitude towards their work. That is, it would reinforce the behaviour towards their work of which EE is a subset.

5.4 SUMMARY

Generally, the current research was conducted to assess preservice teachers' environmental literacy. A sample survey was conducted in four Post-Secondary Teacher Training Colleges in the Ashanti Region, using two sets of questionnaire developed by the researcher. The sample for the study was made up of 160 preservice teachers, selected using purposive sampling. A pilot study was also conducted which enabled the researcher to revise the items in the questionnaire. The split-half reliability showing the internal consistency of the two scales using Spearman Brown Prophecy formula, calculated for both instruments was 0.90. The

questionnaires were hand-delivered. Out of the 160 questionnaires that were administered, 147 (93%) were accepted whilst 13 (7%) were rejected. The data collected were analysed statistically using Chi-square (X^2) test, Z-test, Fisher-t-test and Analysis of Variance (ANOVA) at significance level of 0.05. The study revealed among others that:

1. Preservice teachers have positive attitudes and high environmental knowledge
2. Female preservice teachers possessed not only a high environmental knowledge but also a more positive attitude towards EE than their male counterparts.
3. Urban preservice teachers have lower level of Environmental knowledge as compared to their rural counterparts.
4. There is no difference between the environmental attitudes of urban and rural preservice teachers.
5. The study revealed that there was no significant relationship between preservice teachers'environmental attitude and knowledge.

5.5 CONCLUSIONS

The questions that provided the main focus of this research were:

i. What are the attitudes of preservice teachers towads EE?

ii. Do preservice teachers have the requisite environmental knowledge to impart on the pupils/students at the basic level of education?

iii. Is there any relationship between attitudes and knowledge relevant to environmental issues held by preservice teachers?

The following conclusions can be drawn from the preceeding analysis.

(1) Preservice teachers' attitude/knowledge towards EE can be differentiated by sex/location (a) Female preservice teachers possessed more positive attitude towards E.E. than their male counterparts. (b) Urban preservice teachers have lower level of environmental knowledge as compared to their rural counterparts.

(2) The findings showed a generally favourable attitude and high environmental knowledge of all categories of respondents which were involved in the study.

(3) Lastly, the study revealed that, there was no significant relationship between preservice teachers' environmental knowledge and attitude.

On the basis of the findings in this study, preservice teachers can be described as being environmentally literate and will be able to successfully implement E E programmes in schools in Ghana.

5.6 RECOMMENDATIONS

On the basis of the findings, the following recommendations are being proposed:

1. Major differences exist between rural and urban preservice teachers' environmental knowledge as urban preservice teachers showed lower level of Environmental Knowledge in the study. These regional differences probably could be minimised by identifying each region with its special needs in EE. Two ways of doing this are apparent:
   (i) enrich EE resources (including teacahers) in urban areas, and
   (ii) empower urban teachers to bring about the improvement of EE in urban schools.

   In addition, all teachers need to be updated in Environmental Education.

2. Generally, since information and direct experience were recommended as two of the most essential components in affecting one's performance related to issues (Newhouse, 1990), EE in urban schools could be reinforced through providing preservice teachers more direct contact with information and opportunities. Several channels can be utilised to provide information for preservice teachers. For instance, field trips, project work, debates, role playing etc are especially useful for providing new experiences for preservice teachers. Tutors should consider field trips as key features of their environmental teaching for

enlightening environmental concerns of all preservice teachers. In addition, video tapes, publications and instructional materials relevant to environmental issues in the libraries are also useful to compensate for preservice teachers' lack of direct experience of regional issues. To this end, instructional materials synchronised with special environmental events are also effective at impressing preservice teachers deeply.

3. Even though preservice teachers expressed positive attitudes and favourable environmental knowledge, there is still room for improvement. There is the need for intensive, well-planned and meaningful public education on EE. This can be achieved when all available media houses as well as organised public forums are utilised to the maximum to sufficiently educate the public on the environment and the need to live in harmony with the environment. Again, in order to improve or maintan the standard set, teacher education must also respond by providing appropriate course work and models for preservice and in - service teachers.

Special in-service programmes developed for teachers in different areas are needed. A supporting group authorised by the Ministeries of Education and Environment, Science and Technology could be organised to provide teachers with necessary assistance and consultation. This direct service for teachers can minimise the gap between policy makers and teachers and improve E E in urban schools and all preservice teachers more efficiently and effectively.

4. Local environmental issues that are familiar, could be used to motivate preservice teachers to show concern for the environment. After one's awareness of the environment is aroused by daily issues, then the outside world situation is easily introduced for comparison. Preservice teachers can compare environmental information from various regions, creating clear images of differences between areas and motivating them to acquire broader concepts and attitudes towards EE.

5. Furthermore, EE groups (clubs) in schools need to be organised and operated functionally. EE groups are recommended to include teachers, administrators and prospective students to facilitate environmental activities in the school. Parents should also be invited to the groups. Through their participation the efforts in the school can combine with the community.

6. The success of any educational programme depends largely on the availability of appropriate material inputs. While the availability of material inputs motivate, their non-availability frustrates the implementors of the programme. Therefore, adequate provision should be made for the supply of these inputs to the schools/colleges on time by the teacher education unit of the Ghana Education Service. This may be an effective way of eleminating frustration among both tutors and preservice teachers and enlisting their support for the EE programmes.

7. It is necessary therefore that research and evaluation component be made to run through the entire life-span of EE programmes by the Ministries of Education, Environment,

Science and Technology. This component should be intensified in this special area as a way of offering suggestions and finding solutions to environmentally related problems

8. Since attitudes are not sex-specific and innate but rather depend on human motivation and learning, both male and female preservice teachers should be motivated and exposed equally to a procedure. Finally, to raise the awareness of preservice teachers as far as EE is concerned, environmentally related campaign must be stepped up in every part of the country so as to maintain the modest achievement exhibited so far, since the inception of the programme in the country.

5.6. 1 AREAS OF FURTHER RESEARCH

Though the hypotheses posed at the beginning of the study and other interest areas raised for investigation have been exhaustively grappled with, a few issues and new areas have cropped up for further investigations. Certainly, the results of the study are encouraging.. It is not possible to generalise beyond the sample used in the study. The size of the sample precludes any generalisation in that regard.

(i) To generalise the findings of this study for all students in the second cycle schools in Ghana; there is the need to extend the research to cover other Teacher Training Colleges in other regions of Ghana. Also, it could be conducted in such a way as to cover both Senior and Junior

Secondary Schools in the country. Further study needs to be conducted to test the reliability of these results, utilizing a larger sample drawn from similar populations.

(ii) Future researchers could investigate the relationship between attitude and knowledge with special reference to the respondent's residential background,parents' occupational status and education and family income.

Further research should investigate whether the sort of relationship is linear which would suggest that the more a person knows about environmental issues the more likely he/she is to give unqualified support to EE programmes, which in turn leads to action promoting better environmental quality. Additionally, there is the need for empirical science education research that

(i) tests the effectiveness of EE programmes by examining their effects on behaviour and not on attitude change alone.

(ii) establishes causal relationships, not merely correlations between environmental knowledge and attitude but behavioural intentions and behaviour.

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Appendix A

ENVIRONMENTAL EDUCATION (E E) SURVEY
DEPARTMENT OF SCIENCE EDUCATION
UNIVERSITY OF CAPE COAST
CAPE COAST.

A Study is being conducted on the topic "Preservice Teachers knowledge and attitude towards Environmental education (E E)" by a student in the above named department.

This questionnaire that you are being asked to complete, forms part of the study. Kindly read through the items and please respond to the various items. Be assured that your responses will be treated strictly on confidential basis. Your reaction to all the items will be most appreciated. Note that, your name is not required.

Thank you.

SECTION A
BACKGROUND INFORMATION.

Tick (√) in the appropriate box.

1. School ( ) Wesley College
   ( ) St. Louis Training College
   ( ) Akokerri Training College
   ( ) Agogo Presby Training College

2. Gender ( ) Male ( ) Female

SECTION B

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
'U' If Undecided

'D' If you Disagree
'SD' If you Strongly Disagree.

ATTITUDE TOWARD THE ENVIRONMENT

3. Environmental problems are not just irrational use of natural resources and pollution but include problems of under development such as.....

SA A U D SD

(a) Inadequate housing and shelter
(b) Bad sanitary Conditions
(c) Malnutrition
(d) Defective management and production practice
(e) More generally all problems which stem from poverty.

4. As someone who lives in the city/village, you are faced with a number of concerns and a lot of Environmental problems such as.....

SA A U D SD

(a) Crime
(b) Over population
(c) Drugs and Narcotics
(d) Pollution
(e) Traffic Congestion
(f) Poverty
(g) Bush fires
(h) Deforestation
(i) Land degradation

5. The following are some of the actions one needs to consider, in solving most Environmental problems in his area.

SA A U D SD

(a) Complain
(b) Use a car less frequently
(c) Planting more trees

SA A U D SD

(d) Pay high prices for goods so that industry could recycle and install anti - pollution devices in the factory.

(e) Join a neighbourhood or environemental 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

6. Your neighbours and friends talk/think/ worry about environmental issues more than you do SA A U D SD

7. Environmental problems are such a bother that: SA A U D SD

(a) They make me mad

(b) They make me annoyed

(c) They make me depressed

8. The following statements are related to your attitude toward street garbage pollution. These are some of the steps that need to be taken to improve the sanitary conditions in your area.

SA A U D SD

(a) Pay a refundable deposit on all beverage containers

(b) Complain to authorities about litter

(c) Separate your trash so that cans, jars, bottles and newspaper could be recycled .

(d) Stop using disposable products such as paper cups, paper, plates, polythene bags and plastic utensils.

(e) Pick up litter on the street.

(f) Pay to have your trash separated so that it could be recycled .

(g) Ask someone to place more trash containers on the street.

ATTITUDE TOWARDS ENVIRONMENTAL EDUCATION (EE)

9. Read the statements below and choose those which show your feelings towards Environmental Education (EE) by ticking under the following headings'

SA, A, U, D SD.

(a) It is not clear what to learn under EE.
(b) Topics on Environmental issues should not be handled by Science teachers only.
(c) Some teachers avoid EE because they are not very good at Science.
(d) Some topics in EE are not interesting .
(e) I would rather do anything else than sweep/wash the bathroom/toilet at my leisure time.
(f) I do not remember the day I invovled myself in a clean-up exercise organised in my area.
(g) I feel bad when I see people throwing rubbish, pieces of paper etc about.
(h) I do not see anything embarassing about putting refuse into nearby gutters.
(i) Well laid out garbage/refuse disposal systems in schools is NOT a good way of promoting environmental sanitation.
(j) Throwing waste eg, banana, orange peels etc. into garbage bins should not be encouraged in schools.

10. The following is a list of statements about Environmental Education (EE) as a subject. Tick against each statement which you agree or disagree with reference to the subject under the headings, SA, A, U, D, SD.

(a) No matter what happens, this subject comes first.
(b) I would rather study this subject than eat.
(c) I love to study EE.
(d) EE as a subject is of great value.
(e) This subject has an irrestible attraction for me.
(f) I really enjoy this subject.
(g) EE is a cultural subject.
(h) EE is a good subject

(i) EE is very practical SA, A, U, D, SD

(j) This subject is profitable to everybody who takes it .

(k) I am completely indifferent to EE.

(l) EE thrills and I like it better than any other subject.

(m) I like EE but I like other subjects just as well.

(n) Sometimes I enjoy the challenges presented by Environmental problems.

11. This is to find out how you feel about EE. You are to read each statement carefully and decide how you feel about it. Then indicate your feelings by ticking under the following headings SA, A, U, D, SD

(a) Bush fires make me nervous .

(b) There is a lot of fun joining environmental clubs.

(c) EE is fun.

(d) I have always liked EE.

(e) EE often makes me feel angry.

(f) EE is an interesting subject

(g) Environmental problems often scare me.

(h) EE tests always seem difficult.

(i) EE is boring

(j) My mind goes blank and I am unable to think clearly when I see land being degraded (eg topsoil being scrapped off).

(k) I think about Environmental problems outside of class and like to solve them.

ENVIRONMENTAL KNOWLEDGE TEST (EKT)

The following statements/questions are meant to assess your knowledge on Environmental issues. Please answer all questions. Choose the one that is appropriate.

1. When fossil fuels are burned, the following are the principal products EXCEPT:
   (a) Carbon dioxide.
   (b) Water vapour.
   (c) Oxygen
   (d) Dust and soot.

2. The whole set of natural or biophysical and man made or socio-cultural systems in which man and other organisms live, work and interact is called the;
   (a) Environment.
   (B) Ecology.
   (c) Habitat.
   (d) Home.

3. The 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 is known as environmental
   (a) degradation
   (b) protection
   (c) pollution
   (d) sanitation

4. To safeguard animal and plant life, it is necessary to .....
   (a) plant flowers in one's balcony.
   (b) become a vegetarian
   (c) keep a pet
   (d) preserve the environment in which animals and plant live.

5. Which of the following is NOT a "green house gas" ?
   (a) Carbon dioxide (CO_2)
   (b) Chloroflouro carbons (CFC_s)
   (c) Oxygen (O_2)
   (d) Carbon monoxide (CO)

6. Which of the following is not one of the six most common childhood diseases?
   (a) measles.
   (b) chicken pox.
   (c) malaria.
   (d) yellow fever.

7. The main causes of deforestation are the following , EXCEPT
   (a) increasing demand for agricultural land.
   (b) cutting trees for fuelwood (logging).
   (c) bushfire.
   (d) disappearance of wildlife.

8. Which of these bodies, is responsible for data gathering, monitoring and evaluation of environmental issues.
   (a) Environmental Association of Ghana (EAG)
   (b) Environmental Protection Agency (EPA)
   (c) Friends of the Environment.
   (d) Green Forum.

9. The main Environmental peoblems associated with mining in Ghana are the following EXCEPT;
   (a) water pollution.
   (b) air pollution
   (c) land degradation.
   (d) noise pollution.

10. Overgrazing, clearing of bush and deforestation are major causes of
   (a) erosion.
   (b) the high cost of land.
   (c) an increase in yield.
   (d) over population.

11. One of the best methods for reversing or halting the process of deforestation is
    (a) logging
    (b) weeding
    (c) Tree planting
    (d) bushfires

12. Oil spills are a threat to all EXCEPT one of the following;
    (a) fishing
    (b) tourism
    (c) saltmaking
    (d) hunting

COMPLETE THIS SECTION AS PART OF THE STUDY

13. Mention any traditional practice or taboo in your culture that has either negative or positive impact on the environment.
    (i) Negative.....
    (ii) Positive.....

14. List four major Environmental problems in Ghana.
    (i) ..... (ii).....
    (iii) ..... (iv) .....

15. What are the causes of the problems in Q. 14?..
    .....

16. Give two reasons each for the disappeareance of animals or plant species

ANIMALS	PLANT SPECIES
(i)	(i) .....
(ii)	(ii) .....

17. What is enviromental conservation?.....
    .....

18. Suggest two ways through which the environment can be conserved.
    (i) .....
    (ii) .....

19. Mention <u>two</u> major processes by which waste materials can be managed.
    (i) .....
    (ii) .....

20. Mention <u>two</u> Non-governmental organisations (NGO's) that show concern for environmental issues.
    (i) .....
    (ii) .....

21. Mention <u>five</u> topics in the primary school syllabus that are relevant to Environmental Education.
    (i) .....
    (ii) .....
    (iii) .....
    (iv) .....
    (v) .....

GOOD LUCK!

Appendix B

DEPARTMENT OF SCIENCE EDUCATION
FACULLTY OF EDUCATION
UNIVERSITY OF CAPE COAST

Our Ref:..... **Date:**.....

.....

.....

.....

.....

Dear Sir,

RESEARCH VISIT

We are introducing the bearer Owusu-Ansah G. who is a Master Student of this Department.

He is embarking on a research which will require the participation of both your staff and selected students.

We would be very grateful if you could give him your usual cooperation.

Thanks.

Yours faithfully

(HEAD OF DEPARTMENT)

Appendix C

CORRELATION OF DEPENDENT VARIABLES

ROW	ATTI(X)	EKT (Y)	RANK(X)	RANK (Y)
1	113	23	4.0	6.0
2	229	56	101.5	77.0
3	233	44	112.5	30.0
4	234	47	115.5	38.0
5	224	54	91.0	68.5
6	255	37	138.5	15.0
7	218	56	70.5	77.0
8	218	47	70.5	38.0
9	222	47	83.5	38.0
10	198	30	33.0	10.0
11	227	40	97.0	19.0
12	152	51	15.0	56.5
13	108	42	3.0	25.0
14	227	40	97.0	19.0
15	240	28	125.0	8.5
16	267	58	146.0	85.5
17	243	61	129.5	95.0
18	218	51	70.5	56.5
19	239	63	122.5	106.5
20	228	67	99.0	119.0
21	232	61	110.0	95.0
22	253	54	137.0	68.5
23	244	47	131.5	38.0
24	222	63	83.5	106.5
25	261	70	144.0	125.5
26	221	70	79.0	125.5
27	226	70	94.5	125.5
28	212	63	55.0	106.5
29	218	77	70.5	142.5
30	147	49	13.0	47.5
31	229	58	101.5	85.5
32	232	63	110.0	106.5
33	220	63	76.0	106.5
34	33	76	1.0	140.0
35	133	44	7.5	30.0
36	203	63	38.5	106.5

ROW	ATTI(X)	EKT (Y)	RANK(X)	RANK (Y)
37	135	51	9.0	56.5
38	216	58	63.5	85.5
39	231	54	107.0	68.5
40	202	47	36.5	38.0
41	205	63	42.5	106.5
42	250	67	135.5	119.0
43	232	76	110.0	140.0
44	207	76	46.0	140.0
45	220	63	76.0	106.5
46	222	81	83.5	146.0
47	235	63	119.0	106.5
48	217	53	66.5	63.0
49	237	79	121.0	144.0
50	177	72	19.0	131.0
51	255	81	138.5	146.0
52	216	47	63.5	38.0
53	149	63	14.0	106.5
54	132	67	6.0	119.0
55	163	63	16.5	106.5
56	137	81	10.0	146.0
57	219	58	74.0	85.5
58	241	51	127.0	56.5
59	245	54	133.0	68.5
60	224	56	91.0	77.0
61	173	56	18.0	77.0
62	222	70	83.5	125.5
63	213	65	56.0	114.5
64	185	72	23.5	131.0
65	182	74	21.0	136.0
66	227	65	97.0	114.5
67	208	42	49.5	25.0
68	221	21	79.0	4.5
69	243	77	129.5	142.5
70	224	21	91.0	4.5
71	229	26	101.5	7.0
72	234	47	115.5	38.0
73	218	56	70.5	77.0
74	222	14	83.5	1.0
75	66	19	2.0	2.5
76	133	54	7.5	68.5

77	115	19	5.0	2.5
78	178	61	20.0	95.0
79	258	58	142.0	85.5
80	189	47	25.0	38.0
81	217	72	66.5	131.0
82	208	51	49.5	56.5
83	206	54	44.0	68.5
84	220	35	76.0	12.0
85	223	42	88.0	25.0
86	284	28	147.0	8.5
87	207	40	46.0	19.0
88	230	58	104.5	85.5
89	223	37	88.0	15.0
90	208	51	49.5	56.5
91	256	42	140.5	25.0
92	216	56	63.5	77.0
93	204	47	40.5	38.0
94	202	72	36.5	131.0
95	196	35	31.5	12.0
96	209	44	52.0	30.0
97	239	49	122.5	47.5
98	191	51	26.0	56.5
99	250	54	135.5	68.5
100	235	49	119.0	47.5
101	222	63	3.5	106.5
102	240	63	125.0	106.5
103	215	61	60.5	95.0
104	221	61	79.0	95.0
105	215	58	60.5	85.5
106	211	42	54.0	25.0
107	203	58	38.5	85.5
108	185	51	23.5	56.5
109	226	70	94.5	125.5
110	230	54	104.5	68.5
111	214	35	58.0	12.0
112	229	74	101.5	136.0
113	216	47	63.5	38.0
114	259	61	143.0	95.5
115	208	67	49.5	119.0
116	225	61	93.0	95.0
117	234	58	115.5	85.5

ROW	ATTI(X)	EKT (Y)	RANK(X)	RANK (Y)
118	214	67	58.0	119.0
119	247	74	134.0	136.0
120	207	40	46.0	19.0
121	234	42	115.5	25.0
122	194	67	27.5	119.0
123	200	72	34.0	131.0
124	201	51	35.0	56.5
125	195	42	29.5	25.0
126	194	51	27.5	56.5
127	195	74	29.5	136.0
128	163	61	16.5	95.0
129	233	67	112.5	119.0
130	242	51	128.0	56.5
131	223	54	88.0	68.5
132	183	61	22.0	95.0
133	231	56	107.0	77.0
134	140	74	12.0	136.0
135	218	49	70.5	47.5
136	256	47	140.5	38.0
137	214	58	58.0	85.5
138	231	70	107.0	125.5
139	262	54	145.0	68.5
140	240	49	125.0	47.5
141	244	51	131.5	56.5
142	204	40	40.5	19.0
143	210	47	53.0	38.0
144	235	49	119.0	47.5
145	196	47	31.5	38.0
146	205	63	42.5	106.5
147	139	37	11.0	15.0