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The status of environmental education in elementary and middle public schools of East Tennessee : a teacher perspective

Amadou Bocar Cire Sall

To the Graduate Council:

I am submitting herewith a dissertation written by Amadou Bocar Cire Sall entitled "The status of environmental education in elementary and middle public schools of East Tennessee : a teacher perspective." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

John R. Ray, Major Professor

We have read this dissertation and recommend its acceptance:

Everett M. Myer Jr., Lonnie M. McIntyre, Frank J. McCormick

Accepted for the Council:

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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Dean of the Graduate School

THE STATUS OF ENVIRONMENTAL EDUCATION IN ELEMENTARY AND MIDDLE PUBLIC SCHOOLS OF EAST TENNESSEE: A TEACHER PERSPECTIVE

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Amadou Bocar Ciré Sall
December 1999

This dissertation is dedicated to my mother Dia Diariata Mamoudou, my son, N'Diaye Boubou Sall, my daughter, Amina N'Diaye Sall, to my brothers and sisters, Sall Abdoulaye Bocar, Sall Ciré Bocar, Sall Goubé Bocar, Sall Coudy Bocar, Sall Mody Bocar, Sall Abou Bocar, Sall Djiby Bocar, Sall Lawel Bocar, Sall Mika Bocar, Sall Oumar Bocar, Sall Aminata Bocar, Sall Oumou Bocar, Sall Maïmouna Bocar, to all my nieces, nephews, and cousins, to all the members of my fedde, and fedde rewré and to the entire Gallé **N'DIAYE BOUBOU** with love, respect and gratitude.

In memories of my late father, Sall Bocar Ciré, my late sisters Sall Fatimata Bocar and Sall Ramatoulaye Bocar, my late brother Sall Ousmane Bocar, my late grand-parents Sall Ciré Aliou and Bama Guédou, my late mother Yéyah Bama, my late uncles Abdoul Dia, and Sambourou, my late cousin Amadou Pathé Dia and my best friend late Abdoulaye Sidiki Bâ.

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ABSTRACT

Worldwide efforts are being made to improve the quality of human life and the quality of the environment. In order to achieve these ends, educators must prepare individuals to become environmentally literate citizens and well-informed decision-makers in a fast changing technological world. This descriptive study used surveys to determine the status of environmental education in East Tennessee school systems as perceived by elementary and middle school teachers. Through this study, information was provided about what is being done and what needs to be done to improve environmental education in the State of Tennessee. A valid and reliable instrument, developed and used in Wisconsin, was mailed to 958 elementary and middle school teachers who were randomly selected from 316 schools in 33 East Tennessee public school systems. Out of the 958 surveys mailed, 432 were returned.

The research findings suggest that teachers believe that it is important to take time to integrate environmental concepts and issues into subjects and at all grade levels of elementary and middle schools. Teachers indicated that a lack of resources/funding was the primary reason they do not infuse education about the environment

into their curriculum. Over two-thirds of the respondents never received either pre- or in-service training in environmental education. In addition, this study also revealed that teachers would infuse environmental education into their curriculum if they had better access to resources/aids for teaching environmental concepts.

In light of the results of this study, most teacher education programs in East Tennessee are not providing environmental education courses to pre- and in-service teachers who, in general, have positive attitudes toward teaching environmental education concepts in elementary and middle schools. Moreover, teachers in East Tennessee generally are not equipped with the knowledge and skills needed to successfully integrate environmental education into their curricula.

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*To what extent do East Tennessee elementary teachers (K-8) perceive themselves as competent to teach environmental concepts including cognitive, affective, and behavioral learning outcomes?

*To what extent do elementary school teachers believe that it is important to meet the goals of environmental education within elementary public school systems of East Tennessee?

*What are the factors that a) encourage elementary school teachers to infuse environmental education concepts into their classrooms and b) that discourage elementary school teachers from infusing EE concepts into their classroom?

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CHAPTER I

INTRODUCTION

At the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro (Brazil) in June 1992, developed and developing countries alike agreed that education is "critical for promoting sustainable development and increasing the capacity of people to address environment and development issues" (United Nations, 1994). This was echoed by other major United Nations conferences including those on population in Cairo, Egypt in 1994, on social development in Copenhagen, Denmark in 1995, on Women in Beijing, China in 1995, and on human settlements, Habitat II in Istanbul, Turkey in 1996 (Hopkins, Damlamian, & Ospina, 1996).

Cultural values, beliefs and worldview of any society are transmitted from generation to generation through the education of its children. Education helps children learn how to deal with change and to adapt themselves to meet life's challenges. According to Fien (1996), "education is recognized as the world's greatest resource in bringing about a preparedness [for a desirable] change in the way most societies conduct their economic and political affairs."

Hopkins, Damlamian and Ospina (1996) argued that "education is no longer seen as an objective in and of itself but as a means to:

- Ensure an informed and understanding populace that is prepared to support changes towards sustainability emerging from different sectors;

- Disseminate the knowledge, know-how and skills that are needed to bring about sustainable production and consumption patterns and to improve the management of natural resources, agriculture, energy and industrial productions;

- Bring about the changes in values, behavior and lifestyle that are needed to achieve sustainable development, and ultimately democracy, human security and peace (p. 3).

It is projected that by the year 2000, the world's population will grow to more than six billion people. On the regional level, Southern Appalachia is one of the most rapid growing population (SAMAB, 1996).

Population pressures play a significant factor in the degradation of the environment. To improve the quality of life of a growing population and to preserve the environment

for generations to come, educators must encourage individuals to become environmentally literate citizens and well-informed decision-makers--the "bottom-line goal of environmental education"(Hungerford, 1988). Educators must take a leadership role in preparing society for an age of accelerating change, diverse and growing populations, an expanding economy, and a changing global environment (National Forum on Partnership Supporting Education about the Environment, 1994). UNESCO (1989) stressed the importance of teaching problem-solving in a different, thought-provoking situations in order to facilitate the transfer of environmental knowledge, skills, and attitudes acquired in the classroom to the learner's decision-making and problem-solving processes in the real world (Connect, 1989). Environmental education, a key to the nurturing of long-term responsibility and to the achievement of a sustainable society, has an essential role to play in the facilitation of informed decision-making (CEE, 1991).

In Tennessee, environmental education is mandated in science, social studies and health curriculum of kindergarten through eighth grades (McKeown-Ice, 1994). A review of the Tennessee Comprehensive Curriculum Guide Grades K-8 by McKeown-Ice (1994) reveals that concepts related to the environment are only mentioned in science,

social studies and health curriculum. She argued that despite the fact that "the remaining curriculum—language arts, mathematics, music, visual art, physical education and computer education—do not include concepts specifically related to the environment", many educators "often infuse environmental education across the K-8 curriculum". According to McKeown-Ice (1994), "this infusion is guided by each teacher's interest and knowledge about the environment". She used the following definitions to classify the concepts described in the Tennessee Comprehensive Curriculum Guide Grades K-8 into:

> a) **environmental concepts** which are concepts that are related to human and environmental interactions . . . Both human and natural components must be present to be included in this category. b) **Science Foundations concepts** which are concepts that help students understand the natural world around them. ...These concepts are traditionally taught in biology, physical geography, physical science, etc. c) **Social Studies Foundations concepts** which are concepts that help students understand the cultural and societal aspects of their community and other communities

around the world. ...These concepts are traditionally taught in history, geography, economics, civic, etc. d) **Health Foundation concepts** which are concepts that give students basic understanding necessary to lead healthy lives, take responsibility for decisions, and contribute to the health of their community (p.3-4).

Statement of the Problem

Economic development has been seen as a cornerstone of social development. The free market, industrial expansion, technological development, etc., have all been promoted "both as ends in themselves and as means by which the lives of all members of society would constantly improve" (Bacon and Wheeler, 1984). But the economic standing of many societies has been improved at high cost to the environment and to human health and safety. As early as 1962, there was evidence indicating that the deterioration of the environment had already jeopardized human health and quality of life. For example, the growing dependence on and excessive use of, chemicals are "affecting the stratosphere, depleting ozone and exposing the earth's surface to higher level of ultra-violet radiation known to cause skin and other cancers" (UNESCO, 1997). These chemicals are also

having a detrimental impact on other aspects of the environment - e.g., causing the extinction of some plant and animal species (UNESCO, 1997). It is estimated that 72 percent of the dryland in North America is already "seriously or moderately" affected by desertification.

Global environmental problems such as pollution (air, water and soil), overexploitation and deterioration of natural resources, energy and food shortages, and solid and nuclear waste mismanagement have become more serious. At the local level, it is reported that:

> Across Tennessee, There are hundreds of inactive hazardous substance sites with the potential to pollute our soil, streams and wells. … Cleaning up these sites requires a great deal of time and money (Tennessee Department of Environment and Conservation (TDEC Reports, 1996, p.10.)

In 1993, Tennessee businesses and industries combined cut their hazardous waste by 54.3 percent. However, in that same year:

> Tennessee exported 53,360 tons of hazardous waste, primarily to Alabama and South Carolina, and imported 111,463 tons of waste, mainly from South

Carolina and Mississippi (TDEC Report, 1996) (p.10).

The increasing deterioration of the environment, which parallels economic prosperity and technological development, has generated grave concern.

In 1991 and 1992, The Roper Organization conducted surveys that tested Americans' "green point average". These surveys indicate that there is a need for American citizens to increase their knowledge of the environment and the integrative skills needed for understanding the interdependent relationships between the environment and the economy" (National Forum on Partnership Supporting Education about the Environment, 1994).

The Great Smoky Mountains National Park, located in East Tennessee, is an International Biosphere Reserve and a World Heritage Site. "The park contains more species of trees than all of northern Europe, half of the old growth forest in the eastern United States, three-fourths of the spruce-fir forests in the Southern Appalachian mountains, and more wildflower species than any other U.S. national park" (Droitsch, 1999). Unfortunately, research has shown that human-made air-borne pollutants such as power plants, factories, and automobiles are threatening the beauty and the health of the Park. Research shows that children, the

elderly, and those with existing health problems are most vulnerable to the ill effects of air pollution. Droitsch (1999) argues that poor air quality not only affects human health but also the region's economic well-being. According to Droitsch (1999), farming and tourism are two important regional industries that will suffer should the park resources continue to decline.

Based in East Tennessee, the Tennessee Valley Authority (TVA) was established in 1933 to help the Tennessee Valley recover from the Great Depression and to improve navigation and to enhance economic development by building dams on the Tennessee River and its major tributaries. TVA generates electricity, promotes responsible agriculture and reforestation of hillsides. Unfortunately, TVA is also responsible for about thirty-three percent of the N0x emissions in the TVA region (TVA, 1995a). Due to growth and development, demand for electrical power is likely to increase. As a result, emissions of both sulfur dioxide and N0X will rise again after 2005 (TVA, 1995a).

The Tennessee Department of Environment and Conservation (TDEC) reveals that:

> During 1994, Tennesseans generated more than 7.3 million tons of garbage - more than a ton per

> person. Surveys of the State's solid waste landfills reveal that much of our waste (36 percent) comes from households, with industrial and commercial waste making up most of the remainder. ... Little attention was given to what was being dumped on or buried in the ground, allowing hazardous and toxic materials to get into our ground and surface waters (TDEC, Report, 1996)(p.9).

In evaluating the health of the state of the bioregion (Seven watersheds which form the drainage basin of the upper Tennessee River), Nolt, Bradley, Knapp, Lampard and Scherch (1997) concluded that "the system of life that inhabits the watershed of the upper Tennessee Valley is, in manifold and interconnected ways, unhealthy".

The realization that clean air, clean water, a strong economy, and healthy people are all dependent on a healthy ecosystem could generate efforts toward achieving a more sustainable society.

Purpose of the Study

The purpose of this study was to develop a body of knowledge that could contribute to a better understanding of the views of elementary teacher (K-8) on environmental education. This study also identified specific areas in environmental education that need to be improved. It does so by investigating the status of environmental education in elementary and middle schools in East Tennessee public school systems and by investigating teachers' attitudes toward teaching environmental concepts, and their perceptions about environmental education training.

Research Questions

This study addressed the following questions:

- To what extent do East Tennessee elementary teachers (K-8) perceive themselves as competent to teach environmental concepts including cognitive, affective, and behavioral learning outcomes?
- To what extent do elementary school teachers believe that it is important to meet the goals of environmental education within elementary public school systems of East Tennessee?
- What are the factors that a) encourage elementary school teachers to infuse

environmental education concepts into their classrooms and b) that discourage elementary school teachers from infusing EE concepts into their classroom?

- To what extent are East Tennessee elementary school teachers trained to infuse environmental education into their classrooms?

Rationale

Natural resources are limited. Therefore, it is essential that everyone understands the value of the environment to their quality of life and that they acquire the knowledge, tools, and ethic to live in ways that minimize the impact of their actions on the environment (The National Environmental Education Advisory Council, 1998). Education can help the public gain the necessary knowledge and skills to understand and resolve environmental problems. Unfortunately, research has suggested that teachers are ill-prepared for teaching about the environment because many teacher education programs (pre-service and/or in-service) are not training educators on how to integrate environmental concepts into their subject matters (Schwaab, 1982; Wilke, Peyton and Hungerford, 1980).

Participants at the UNESCO International Conference in Greece (December, 1997) addressed these issues by trying to

define the role of formal education in building society. They defined the role of formal education as helping "students to determine what is best to conserve in their cultural, economic and natural heritage and to nurture values and strategies for attaining sustainability in their local communities while contributing at the same time to national and global goals." They also argued "Education, in its broadest sense, must be a vital part of all efforts to imagine and create new relations among people and to foster greater respect for the needs of the environment". They recommended that educators should take a leadership role and start with young people.

Although environmental education is included in the K-8 curriculum guide, for Tennessee Public Schools there is no formal policy of guidance on how to incorporate environmental concepts in the curriculum.
Individual teachers who teach environmental subjects tend to do so in an unsystematic manner. This study on elementary and middle school teachers' perceptions regarding environmental education will provide K-8 administrators and others in higher education with information on environmental education necessary for designing and improving teacher training programs. Thus, there is a compelling need to

discover to what extent teachers are prepared to incorporate environmental concepts in their classroom curricular.

At the local level, different agencies came together to address issues relevant to education and the environment. In 1992, the Tennessee Department of Education, the Department of Conservation, and the Department of Public Health, with the collaboration of other agencies (Cooperation Science Education Center, the Center for Teachers, the Tennessee Environmental Council, Tennessee Game and Fish Commission, and the Tennessee Valley Authority), sponsored a conference on Environmental Education at Chapel Hill, Tennessee. The goal of the conference was to give direction to environmental education in the state of Tennessee. At the end of the conference, the participants made recommendations that were compiled under fourteen categories: (1) State plan, (2) Legislation, (3) Leadership, (4) Coordination, (5) Communication, (6) Teacher education, (7) Community education, (8) Information exchange, (9) Survey of resources, (10) In-service education, (11) Curriculum development, (12) Evaluation, (13) Environmental centers, and (14) other. Through this study the present researcher attempted assess the progress on what has been done, or attempted, in implementing these recommendations.

Assumptions of the Study

This study is based on these following assumptions:

- All individuals who participated in the study responded truthfully and to the best of their knowledge.
- Educators play a critical role in helping students be aware of and resolve environmental problems.
- The development of attitudes toward and beliefs about the environment start in the early years of childhood.
- Environmental problems can no longer be dissociated from social, economic and political problems.

Limitations of the Study

The study is limited to the self-perceptions of selected elementary and middle school teachers in selected East Tennessee public schools regarding their competencies in, attitudes toward, and class time devoted to, environmental education at the public elementary and middle school level.

The refusal of teachers to answer some questions in the survey may also be a limitation. Incomplete surveys may not be usable for analysis.

Delimitations of the Study

The population of the study was delimited to East Tennessee public elementary and middle school teachers during the 1998-99 academic year. Since the sample of the study was drawn strictly from elementary and middle school teachers, any generalizations derived from the study was delimited to elementary and middle school teachers (K-8) of East Tennessee public schools.

Definition of Terms

Environmental Education:

> A learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address these challenges, and fosters attitudes motivations, and commitments to make informed decisions and takes responsible action (NEEAC, 1998, p.1).

Formal Education:

> Education involving the formal school system-includes programs and activities taking place in public and private preschools, elementary schools, middle schools,

secondary schools, colleges, and universities (NEEAC, 1998, p.1).

Pre-Service Training:

Training that takes place at colleges and universities before students are certified to teach (NEEAC, 1998, p.1).

In-Service Training:

Training that takes place after teachers are in the classroom (NEEAC, 1998, p.1).

Environmental literacy:

The capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems (Roth, 1992).

Infusion of Environmental Education:

The integration of environmental concepts and skills into existing courses in a manner as to focus on those concepts and/or skills without jeopardizing the integrity of the original course (Ramsey, Hungerford, and Volk, 1992).

Sustainable Development:

Development that meets the needs of the present without compromising the ability of future generations to meet

their own needs (The World Commission on Environment and Development, 1987).

Overview and Organization of the Study

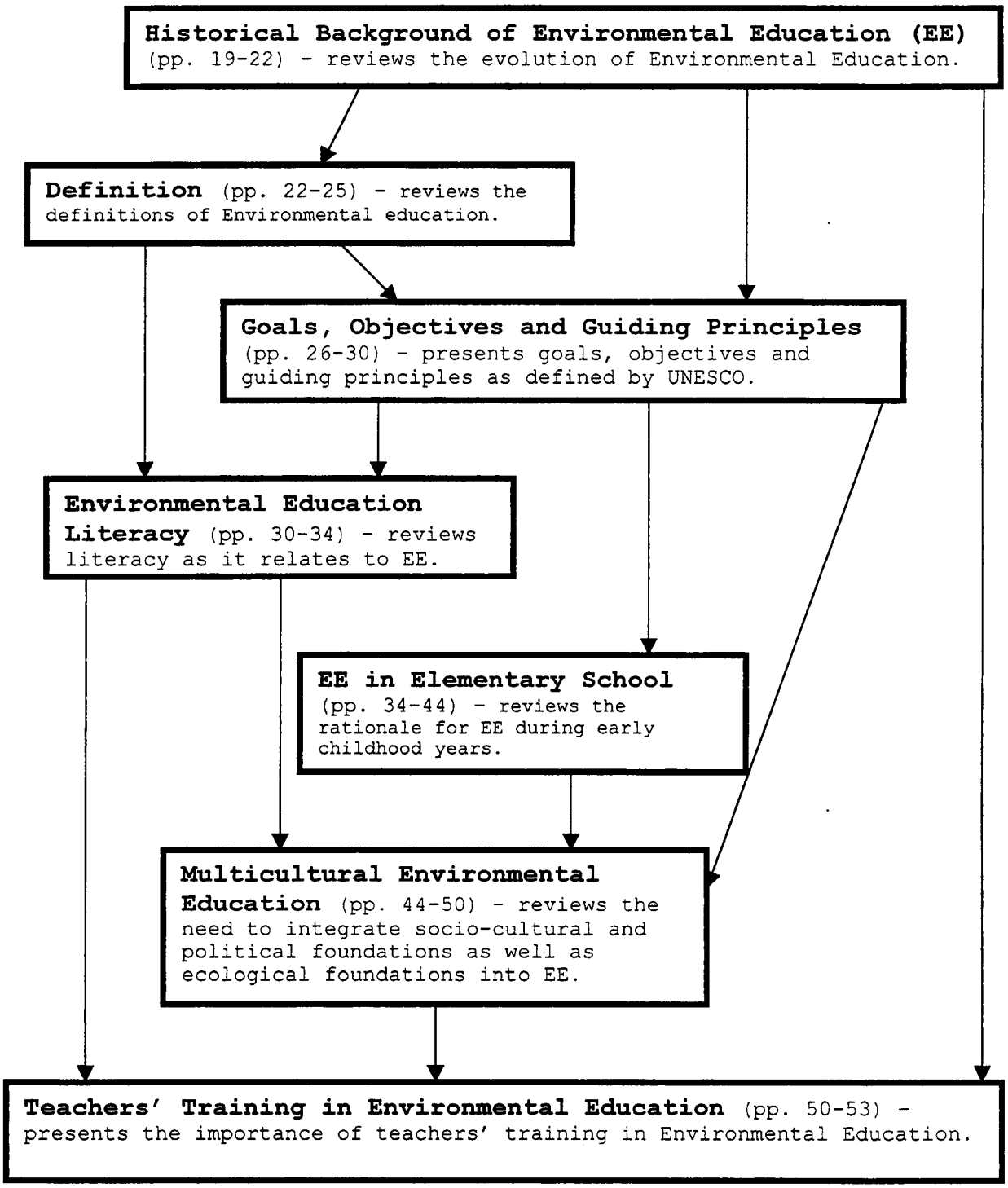
The growing concerns for environmental quality (clean air, quality water ... etc) help the field of environmental education to rally around common goals, objectives and guiding principles. Research suggests that it is important to start environmental education at the elementary school level since children introduced to environmental education tend to develop positive attitudes toward the environment and retain these attitudes over time. Through environmental education citizens can become well-informed decision-makers and effective participants in the formulation of policies that affect their lives. In 1972, The Tennessee Department of Education and other agencies hosted a conference on environmental education in Tennessee with the goal to give direction to environmental education in the State of Tennessee (Conference Report, 1972). Important recommendations were generated from the conference.

The framework of this research is as follows: Chapter I introduced global and local environmental concerns and explained the need for environmental education at the elementary level (K-8). The study's rationale, purpose, research questions, procedures, assumptions, limitations,

delimitations and definition of terms were also addressed in this chapter. Chapter II reviews the relevant literature. Chapter III describes the population, sampling procedures, questionnaire development, and the collection and analysis of the data. Chapter IV presents the findings of the study and discusses the significance of the results. Chapter V summarizes the findings of this study and offers conclusions and recommendations for future research.

OVERVIEW CHAPTER II

REVIEW of LITERATURE



CHAPTER II

REVIEW of LITERATURE

A review of the literature related to the integration of environmental education in elementary and middle schools indicates that there has been very little research done at this level in the state of Tennessee. According to Robertson (1994), more research is needed to better understand perceptions about aspects pertaining to environmental education among students and teachers.

Historical Background of Environmental Education

Strong public demand for education about the environment in the United States began with the 1962 publication of Rachel Carson's *Silent Spring*. *Silent Spring* also had a tremendous impact on the early phases of the environmental movement and helped to make it "more widespread, popular" and inclusive of "public values that stressed the quality of human experience and hence of the human environment" (National Environmental Education Advisory Council, 1998).

The concept of environmental education can be traced back to Aristotle (Disinger, 1993). The term *Environmental Education* evolved over time, first emerging in the late 1960's (Disinger, 1993). "Nature study", "outdoor education" and "conservation education" are described as the

foundations of what is known today as environmental education (Schoenfeld, 1971; Kirk, 1977; Disinger, 1993). According to Disinger (1993), prior to 1970, the emphasis of environmental education was placed on the learning *in* and *about* the environment for the purpose of improving its quality and on incorporating progressive education, which focused on "learning by doing."

Since the 1970's, there have been efforts to link the status of the environment to human health, science, technology, and societal concerns such as violence, peace, equity, justice, human rights and democracy.

The global concern over environmental degradation led to the United Nations' first conference on the Human Environment in Stockholm, Sweden in 1972. At this conference, the focus was on "the role of education, both the public and the specialist, in the solution and prevention of the world's environmental problems" (Canadian Commission for UNESCO, 1978).

In 1975, UNESCO and the United Nations Environment Programme (UNEP) implemented the International Environmental Education Programme (IEEP), designed to:

- Facilitate the coordination, joint planning and pre-programming of activities essential to the

development of an international program in environmental education.

- Promote the international exchange of ideas and information pertaining to environmental education.
- Coordinate research to understand better various phenomena involved in teaching and training.
- Formulate and assess new methods, materials and programs (both in-school and out-of-school, youth and adult) in environmental education.
- Train and retrain personnel adequately to staff environmental education programs.
- Provide advisory services to member states related to environmental education (Stapp, 1976, p 36-37).

According to Fien (1996), "education is recognized as the world's greatest resource in bringing about a preparedness [for a desirable] change in the way most societies conduct their economic and political affairs" (Fien, 1996).

In 1977, UNESCO and UNEP sponsored the world's first intergovernmental conference on environmental education in Tbilisi, Georgia (Russia). The Declaration of Tbilisi, has been used by developed and developing countries as a framework for the establishment of environmental education programs and activities for use in different grade levels (UNESCO, 1983b).

Definition of Environmental Education

The multidisciplinary and interdisciplinary nature of environmental education make it difficult to define (Trisler, 1993). According to Ramsey, Hungerford, & Volk (1992), the meaning of environmental education can be associated with concepts in ecology, outdoor education, environmental science or instruction about issues.

One of the earliest definitions of the goals of environmental education was supplied by Stapp, Bennet, Bryan, Fulton, Swan, Wall and Havlick in 1969:

> Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (p.30).

The U.S. Environmental Education Act of 1970, the first Act that dealt with environmental education, defined environmental education by identifying its components:

> The educational process dealing with man's relationship with his natural and man-made surroundings, and includes the relation of population, pollution, resource allocation and depletion, conservation, transportation, technology, and urban and rural planning to the total human environment (Public Law 91-516, p.1312).

In the late 1960's and early 1970's, the public was pressuring lawmakers to respond to their environmental concerns. The National Environmental Policy Act of 1969 (P.L.91-190) and the National Environmental Education Act (P.L.91-516) were enacted to address public concerns. Both "Acts identified education as a mechanism for improving the quality of the human environment" (NEEAC, 1998).

A revised National Environmental Education Act was signed into law by President George Bush in 1990 (Public Law, 101-619). In this Act, the definition of environmental education was broadened:

> 'Environmental education' and 'environmental education and training' mean educational activities and training activities involving elementary, secondary, and post secondary students, as such terms are defined in the State in which they reside, and environmental education personnel, but does not include technical training activities directed toward environmental management professionals or activities primarily directed toward the support of non-educational research and development (Section 4).

According to Marcinkowski (1990-91) "The spirit of the act has called for, and has put into place, the mechanism to enhance cooperation and coordination in the field. It is up to organizations, agencies, institutions, programs, and individuals in the field to respond to these calls with a renewed sense of enthusiasm, dedication, and purpose." In other words, it is the responsibility of educators to work together for a common goal: the empowerment of citizens through environmental education.

The United Nations Educational, Scientific and Cultural Organization (UNESCO), created in December 14, 1945, referred to environmental education as:

> The process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture, and his biophysical surroundings. Environmental Education also entails practice in decision-making and self-formulation of code of behavior about issues concerning environmental quality (UNESCO, 1973).

This definition of environmental education includes the acquisition of knowledge, attitudes, skills and participation. Both the quality of human life and the quality of our environment are elements of great concern in this definition of environmental education (Hassan, 1984). UNESCO, which serves the cause of world peace and humankind by means of cooperation in the fields of education, science, and culture (Kastenholz & Erdmann, 1994), proposed to develop an interdisciplinary environmental education program which emphasizes the humanistic dimension of education and training with a view toward the 21st century.

Goals and Objectives of Environmental Education

In response to the global "environmental crisis", the international community has held conferences in Stockholm, Sweden (1972), Belgrade, Yugoslavia (1975), Tblisi, Georgia

(Russia) (1977), Rio De Janeiro, Brazil (1992), New York, U.S.A (1997), and Thessalonike, Greece (1997). These international conferences have generated common goals, objectives, and guiding principles for environmental education.

At the 1977 conference in Georgia (Russia), UNESCO in collaboration with UNEP endorsed the following goals, objectives, and guiding principles for environmental education in a document known as the Declaration of Tbilisi. The *goals* of environmental education are:

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

The categories of environmental education *objectives* are:

Awareness: to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.

Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.

Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.

Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems.

Participation: to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

Guiding principles--environmental education should:

- Consider the environment in its totality--natural and built, technological and social (economic, political, cultural-historical, moral, aesthetic);
- Be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages;
- Be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
- Examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas.
- Focus on current and potential environmental situations while taking into account the historical perspective;
- Promote the value and necessity of local, national, and international cooperation in the

prevention and solution of environmental problems;

- Explicitly consider environmental aspects in plans for development and growth;
- Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- Relate environmental sensitivity, knowledge, problem-solving skills, and values clarification to every age, but with special emphasis on environment sensitivity to the learner's own community in early years;
- Help learners discover the symptoms and real causes of environmental problems;
- Emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;
- Utilize diverse learning approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience (The Tbilisi Declaration, 1978).

These goals, objectives and guiding principles provide a useful framework for environmental education programs in both developed and developing countries. Most curriculum planners take into consideration the UNESCO framework when developing environmental education programs for all grade levels.

Environmental Education Literacy

Although environmental literacy is not mentioned in most discussions of education goals, it may be inferred from considerations of specific literacies such as those identified in America 2000, e.g. science literacy (Disinger and Roth 1992).

The New World Dictionary of the American Language defines literacy as the "ability to read and write," whereas Michaels and O'Connor (1990) describe it as:

> Literacy ... is an inherently plural notion. We each have, and indeed fail to have, many different literacies. Each of these literacies is an integration of ways of thinking, talking, interacting, and valuing, in addition to reading and writing ... Literacy then is less about reading and writing per se, and is rather about

ways of being in the world and ways of making meaning with and around text.

According to Disinger and Roth (1992), literacies are usually defined in cognitive terms, which is an essential element that conditions thoughtful behavior and action. They also argue that educational systems limit their operational objectives to the development of knowledge, and skills related to their effective and efficient acquisition; they do not actively promote the pro-active development of responsible environmental behavior, as described by Hungerford (1987). It is assumed that individual and societal environmental change is a direct result from the development of necessary knowledge and skills (Iozzi, 1989). According to Roth (1992), environmental literacy should be defined "in terms of observable behaviors. That is, people should be able to demonstrate in some observable form what they have learned, their knowledge of key concepts, skills acquired, disposition toward issues, and the like (Roth, 1992). The end result of environmental education is to "empower" citizens. However, this empowerment can only take place if the citizens are environmentally literate. In many so-called democratic countries, "the votes of the citizens may be counted, but the citizens themselves don't count for

much in the operation of society. Inequalities dominate in all spheres of life: in the sharing of wealth, jobs, opportunities and social services, gender discrimination, and, of course, political influence and power" (UNESCO, 1997). The voices of the silent majority are hardly heard by the policy makers.

UNESCO-UNEP views citizens' environmental literacy as their having acquired basic functional education, the "elementary knowledge, skills and motives to cope with environmental needs and contribute to sustainable development" (Connect, 1989). Roth (1992) defines environmental literacy as "the capacity to perceive and interpret the relative health of environmental systems and to take appropriate action to maintain, restore, or improve the health of those systems." He also identifies knowledge, skills, affect, and behavior as the four strands on which education for environmental literacy should focus. Environmental literacy evolves around three levels of literacy:

> ***Nominal***, indicating ability to recognize many of the basic terms used in communicating about the environment and provide rough, if unsophisticated, working definitions of their meanings;

Functional, indicating a broader knowledge and understanding of the nature and interactions between human social systems and other natural systems;

Operational, indicating progress beyond functional literacy in both the breadth and depth of understandings and skills (Roth, 1992).

Disinger and Roth (1992) emphasize that the acceptance by educational systems (formal and non-formal) in fostering environmental literacy as part of their mission, will generate "more individuals achieving higher degrees of competency on the environmental literacy continuum." Research suggests that in practice, educators have emphasized on the affective rather than the cognitive domain in the development of skilled and well-informed citizens to be capable and willing to take action to protect and improve the environment (Gigliotti, 1990; Iozzi, 1989a). Research also suggests that any teaching/learning approach that emphasizes one dimension (affective or cognitive) will fail to bring about positive change in environmental behavior. The use of a more holistic approach to teaching/learning that would combine cognitive, affective and behavioral domains appears to have tremendous potential for the greater

achievement of environmental education goals -- to develop responsible environmental behavior.

Environmental Education in Elementary Schools

In order to become responsible for themselves, humanity, and the natural environment, young people must learn and accept their role as members of ever-growing communities (Deutsche UNESCO-Kommission, 1990).

A favorable attitude toward the environment can be fostered in young children. Research suggests that environmental education during the early childhood years plays a critical role in shaping life-long attitudes, values, and patterns of behaviors toward natural environments (Tilbury, 1994; Wilson, 1994).

According to Wilson (1996), The rationale for environmental education during the early childhood years is based on two premises. The first premise is that children who do not develop a sense of respect and caring for the natural environment during their first few years of life may never develop such attitudes (Tilbury, 1994; Wilson, 1994). The second premise is that the development of a healthy child, the enhancement of his/her learning and quality of life over the span of his/her lifetime could be achieved by helping the child experience positive interactions with the natural environment (Wilson, 1994).

Elementary schools are found to be the most appropriate level to start implementing environmental education. Jaus (1984) found that elementary school children introduced to environmental education not only developed positive attitudes toward the environment, but also retained these attitudes over time.

Other research suggests that the greatest influence of educational programs would take place in early childhood (Chemers & Altman, 1977; Moore, 1977; Miller, 1975; Cohen & Hollingsworth, 1978, Moore, 1977). Therefore, it is important to start environmental education at the elementary and/or middle school level as suggested by Knapp (1972). Fleming' evaluation of the effectiveness of Project WILD (1983), found that elementary students gained more on both cognitive and affective measures after receiving Project WILD training than did middle, junior high and senior high students. Project WILD is a "conservation and environmental program for kindergarten through high school. The project is designed to provide teachers with instructional materials and techniques for integrating education about wildlife and the environment into the mainstream of public education" (Charles, 1989).

A nationwide survey found that less than 20 percent of elementary schools and between 21-40 percent of secondary

schools in the State of Tennessee infused environmental education into their curricula (Disinger, 1989). The survey also revealed that "infusion was identified as the required mechanism" (Disinger, 1993) to deliver environmental concepts. Ramsey, Hungerford, and Volk (1992) defined infusion as "the integration of content and skills into existing courses in a manner so as to focus on that content (and/or skills) without jeopardizing the integrity of the courses themselves." In order for the implementation of the infusion approach to take place, teachers need to be well prepared. However, many state education agencies including the state of Tennessee have no formal policy with respect to the infusion of environmental topics in the school curricula (Disinger, 1989). In 1995, only eleven states required environmental education to be incorporated into core curriculum (NEEAC, 1998). As a result, most school administrators and individual teachers at the local level are left to decide how to implement the tasks recommended by the state.

In 1972, The Tennessee Department of Education and other agencies hosted a conference on environmental education with the goal of providing direction to environmental education in the state (Conference Report, 1972).

Important recommendations generated from the conference were:

State Plan

- Recommend endorsement of the State Plan for Environmental Education, Appreciation and Action in Tennessee, (tentative plan) and further that Phase III be implemented as soon as is feasible.

Teacher Education

- Develop and implement a certification program to insure that teachers are trained in the area of environmental education.
- To provide support (funding) for teacher training in curriculum development.
- Reassess the minimum certification requirements to include environmental education courses and establish guidelines for minimum certification requirements in environmental education.
- Require certification in Environmental Education for teachers of environmental education.

- Require an environmentally field-oriented course of all certified teachers.
- Recommend that minor areas of study in Environmental Education be offered at state universities, with the State Department of Education providing necessary materials for implementation.
- Review and service certification procedures relative to the certification of environmental education specialists.

In-service Education

- Provide a system at the state level for in-service training for teachers.
- Provide on-site in-service training in environmental education through appropriation and funding.
- Include an evaluative procedure in the status report to insure that in-service teacher programs contain the skills and knowledge needed to teach environmental education.
- Develop in-service training (summer institutions) for teachers already in the field on environmental concerns (awareness) utilizing

various state institutions and other agencies in the state.

Curriculum Development

- A regulation be formulated requiring that Environmental Education become part of the regular school program as defined by the State Board of Education.
- Provide guidelines useful in the development of environmental education programs at each grade level infused (incorporated in the total curriculum).
- A committee from a broad spectrum of disciplines to be established by the State Department of Education to develop modules of instruction for environmental education for elementary and secondary levels.
- Develop a series of interim instructional activities that can be disseminated for use by local school systems particularly for high school pupils who will graduate within the next three years.

- Make effective use of the Tremont "strand" approach.
- Develop general environmental education curriculum guidelines
- Environmental education should be integrated in the elementary school subjects; the state should require that a course in environmental education be offered at the high school level and further, a required offering be added at the state college and university level.

Evaluation

- To develop an evaluation procedure to determine the effectiveness of the state plan.
- Establish annual evaluation and planning conference for a Tennessee environmental education program.
- To continually evaluate and restructure the environmental education program coordinated by the state.
- To evaluate environmental education activities at the local level though the development and use of performance objectives.

Environmental Centers

- Establish state-funded field environmental centers.
- Provide and promote facilities (field environmental centers) to expose every school child (grades 5-8) to a five- to seven day outdoor learning experience.

In 1979, Fletcher, Rhoten, and Bennett surveyed elementary schools, secondary science and social studies teachers, as well as principals and supervisors of instructions, to assess their view regarding the current status of environmental education in Tennessee. Since the rate of return was only 35.4 percent, Fletcher et al., could not draw any strong inferences about educators in Tennessee.

They found that 93.9 percent of the respondents believe that there is a need for teaching environmental education in public education. About 69 percent of the respondents indicated they had not studied environmental education in college, while 65 percent indicated they had not participated in workshops or in-service programs related to environmental education. The question then arises:

do we really know if environmental education concepts are being infused in Tennessee elementary public school curricula?

Pettus and Teates (1993) found that Virginia elementary school teachers did include environmental concepts and problem solving skills in their classroom teaching. However, in that same study teachers reported that they were not well prepared to help their students learn more about the environment.

Lane et al. (1994) found that lack of an environmental education background and the belief that environmental education is unrelated to their discipline are the main factors that prevent teachers from infusing environmental education into school curricula. They also found that the majority of the teachers surveyed stated that they spend less than 1/2 hour per week per subject teaching about the environment (Lane et al., 1994). Their analysis also revealed that the more time teachers spent teaching about the environment the greater the number of environmental education in-services taken.

The common barriers to implementing environmental education include lack of time, instructional materials, funding, training, and commitment.

Although considerable research has generally shown teachers to have positive attitudes toward environmental education, there is no guarantee that environmental education programs will actually be implemented, especially in social science classes (Ham & Sewing, 1987).

Multicultural Environmental Education

According to Cervantes (1984), "The common school reflects a Judeo-Christian model of education implying specific value orientations, role expectations, and task behaviors. The common school today is believed to reflect an idealized, monolithic value system dominated by the notions of democracy and equality." In reality, schools are not providing equitable quality education since social class and race dictate who get quality education. The development of curricula for public schools is influenced by White Anglo-Saxon middle-class values and experiences (Cervantes, 1984). The concepts of "melting pot" and "assimilation" are being increasingly challenged (Banks, 1992, Bruce, 1994). According to Bruce (1994), "the world is being forced from many directions to seek new ways of viewing things from a global perspective" (Bruce, 1994). The United States of America is experiencing a great increase in racial diversity (Gigliotti, 1990). It is projected that by the year 2020 the population of non-white students in public schools will

be 50 percent. The culturally diverse classrooms and communities do reflect the cultural plurality of the population of the United States of America. Any education that does not take into account these realities will fail to adequately prepare the younger generation for the 21st century. Environmental education, like any other field, must be redefined to fit the reality of today and tomorrow.

According to Running-Grass (1996), "Environmental education must evolve as it encounters new cultural realities in specific community contexts." The type of environmental education he advocates is one that "recognizes and acknowledges the pivotal role of culture in the process of education and its underlying values and pedagogy" (Running-Grass, 1995). Moreover, McKeown-Ice (1994) points out that:

> It has become obvious in the last decade that understandings of socio-cultural-political systems are important to the resolution of environmental issues. As a result, environmental education needs to include socio-cultural-political foundations as well as ecological foundations (p.3).

Multicultural education is not a new issue. The historical antecedents of multicultural education may be traced to the period between 1880-1920 (Suzuki, 1984). Then, "In the 1950's and 1960's ethnic minorities, followed by women and other groups, began to speak up as subjects of their own discourse rather than objects acted upon in a discourse framed by others, and in response, the modern multicultural education movement began to take shape" (Haddad, 1994).

Multicultural education means different things to different people. According to Haddad (1994), multicultural education is one that "attempts to incorporate other world views into the mainstream of the American public school." The Florida Multicultural Education Review Task Force defines multicultural education as follows:

> Multicultural education is an education that prepares students to live, learn, communicate and work to achieve common goals in a culturally diverse world by fostering understanding, appreciation and respect for people of other ethnic, gender, socioeconomic, language and cultural backgrounds (Bragaw & Thomson, 1992).

Different cultures getting together means different experiences and different ways of seeing and doing things, which could only add numerous alternatives to the solutions of social, economical, political and environmental problems. The fear of the unknown can only be overcome by education. Other ways of thinking and acting should be learned, tolerated and accepted.

Demographic and political changes have led the formerly silent voices of people of color, women, and poor people to express their desire for a review of the vision of environmental education that was characterized as belonging to that of the white middle-class male. According to Running-Grass (1995), social justice and environmental issues cannot be separated conceptually or politically. Environmental education needs to go beyond simple integration with people of diverse cultures. It should also "involve people and communities and reflect and amplify their histories and lives" (Running -Grass, 1995).

Running-Grass (1995), the director of the Three Circles Center, has incorporated some key ideas, and principles of Multicultural Environmental Education, as a platform for continued discussion:

- A multicultural environmental education critiques the forces which have oppressed people as well as nature in general.
- In order to develop more inclusive program models, a multicultural environmental education acknowledges that children may have different needs based upon and shaped by how and where they live.
- A multicultural environmental education illuminates the essential idea that all cultures have a relationship with the natural world, which they and all others can draw upon for understanding and for inspiration.
- A multicultural environmental education helps children become aware of, understand, accept and celebrate other cultures and their environment traditions.
- A multicultural environmental education promotes a society at peace with the natural world and itself.
- A multicultural environmental education involves family and community institutions directly in the development and implementation

of environmental education curricula and programs.

- A multicultural environmental education affirms that--beyond development of environmental literacy -- community empowerment and restoration are necessary steps and long term goals of our efforts.
- A multicultural environmental education takes a planetary perspective, blending local and planetary environmental justice issues.
- A multicultural environmental education recognizes that health of the ecosystems, communities and individuals are inextricably linked.
- A multicultural environmental education recognizes the impossibility of a "non-advocacy approach." (Running-Grass, 1995).

An open dialogue is important to the process of redefining and setting goals as it relates to environmental education and cultural diversity in societies. Environmental education has historically focused primarily on ecological concepts with little attention given to students' perceptions and experiences, their cultural

background or interests (Cantrill, Hungerford, and Volk, 1990; Running-Grass, 1995; Taylor, 1996).

Teachers' Training in Environmental Education

Teachers play a key role in developing an environmentally literate society (Buethe & Smallwood, 1987; Burrus-Bammel & Bammel, 1990; Ham, Rellergert-Taylor, & Krumpe, 1987-1988; Ramsey, Hungerford, & Volk, 1992; Stone, 1989). However, research suggests that teachers must know a subject very well before they feel comfortable teaching it to others (Pool, 1991). Therefore, training teachers is essential for them to feel that competent and self-confident in teaching about the environment. In 1995, only three states had mandates requiring environmental education training for teachers (NEEAC, 1998). Environmental educators must use a range of strategies that incorporate environmental knowledge, attitudes, values and behavior. In order to implement these strategies, teachers need to be well prepared by improving their knowledge, skills and attitudes about environmentally related topics. Unfortunately, many teachers get environmental education training after they leave the university and start teaching (NEEAC, 1998).

Teachers play a key role in successful environmental education because "not only do they teach it, they often are

instrumental in establishing the need for teaching about the environment, developing curricula, designing materials, and practicing certain methodologies" (Towler, 1980-81). Wade (1996) argues that "the lack of appropriate, applied educational paradigms is acutely manifest in the professional development of teachers." However, he acknowledged that there are promising professional development paradigms. He also recommends the adoption of an "information-critique, reflective-practitioner perspective", in which the environmental educator is "participatory and practice-based; inquiry-based; critical; community-based; and collaborative" (Hart & Robottom, 1990, p.104).

There is a compelling need to find out to what extent teacher education programs are meeting the Environmental Education needs of classroom teachers. It has been demonstrated that very little time is spent in the classroom on environmental education subjects unless the teacher has a special interest in the topic (Howe et al., 1987). Wilke (1985) argued "teacher preparation programs in environmental education remain relatively scarce and poorly developed." According to Disinger and Howe (1990), most teacher education programs are not designed to train effective teachers of environmental education because:

a) they perceive environment as insignificant component of existing curriculum areas, and b) the time available is not enough to study environmental issues.

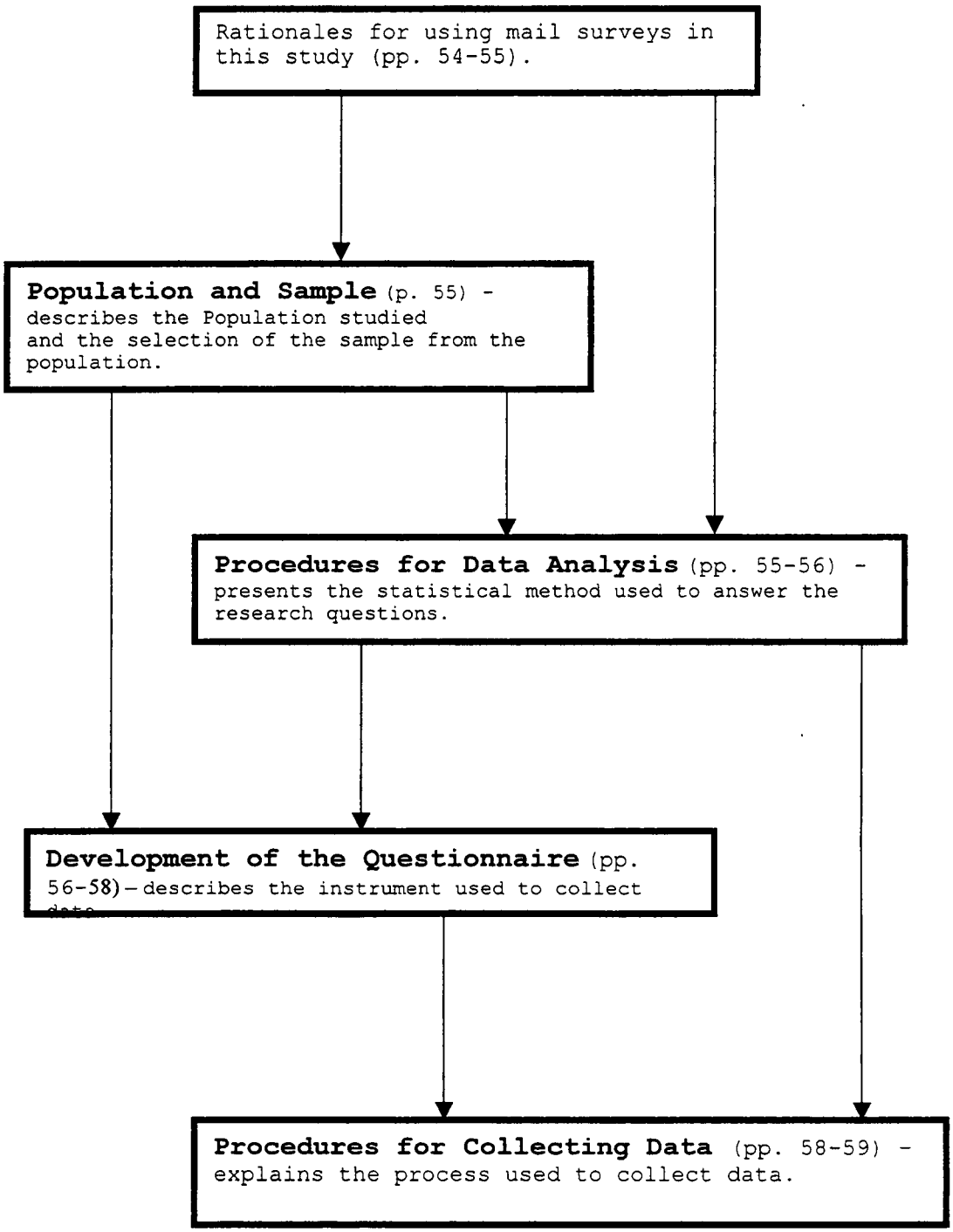
In fact, very few teacher-education programs in the past offered environmental education courses (Wilke & Leatherman, 1983; Buethe & Smallwood, 1987; Stone, 1989; Disinger & Howe, 1990). Previous studies have identified factors such as lack of time and environmental education background discourage teachers from learning and teaching about the environment.

Overview

The main concern of this Chapter was to review the literature related to environmental education at the elementary school level in the United States. The concept of environmental education and its historical background development, definitions, goals and objectives were described. The definition of environmental education literacy, the status of environmental education in public schools, the background and the importance of multicultural environmental education, and teachers' training in environmental education were presented in this Chapter.

OVERVIEW CHAPTER III

RESEARCH METHODS and PROCEDURES



CHAPTER III

RESEARCH METHODS and PROCEDURES

The intent of this study is to investigate the status of environmental education (EE) in elementary and middle public schools of East Tennessee as perceived by teachers randomly selected in those schools during the 1998-99 academic year. Random sampling technique was used because it has the potential to insure the representation of teachers from different public schools in East Tennessee. Babbie (1989) argues that "problems of sampling and generalizability are greatest in the study of social behavior." Problems such as low response rates, which raise questions as to the representativeness of the survey sample (Babbie, 1989), and difficult-to-assess constructs as the validity and reliability of the questionnaire, raise concern over the possibility of generating invalid conclusions. Despite these disadvantages, surveys remain one of the best available research tools for investigating people's perceptions (Sherblom, Sullivan, and Sherblom, 1993). Furthermore, surveys are a convenient and efficient way of collecting data (Jane, 1993) from a sample too large or geographically disperse to be directly observed (Babbie, 1989) They are also far more economically feasible than

traveling about to interview a large number of people (Oppenheim, 1966; Alreck & Settle, 1985).

Population and Sample

The population of this study consists of elementary and middle school teachers in East Tennessee as defined by the Tennessee Department of Education (See map Appendix). The targeted population was 6,495 elementary and middle school teachers from 33 East Tennessee public school systems. Using Krejcie and Morgan's table (1970), a sample size of 361 participants was needed to generalize the findings to a population this size.

From a list provided by the Tennessee State Department of Education, 958 teachers were randomly selected. They were subsequently contacted and asked to participate. To insure a greater representation of teachers and schools, one (1) teacher from each school was randomly selected. Additional teachers were added from each school based on this range: 2 to 5 (1 teacher); 6 to 15 (2 teachers); 16 to 25 (3 teachers); 26 to 35 (4 teachers); 36 to 45 (5 teachers); 46 to 55 (6 teachers); and 56 plus (7 teachers).

Procedures for Data Analysis

The study uses a descriptive statistics (frequency, percentage, and mean) to answer questions concerning the current status of environmental education in East Tennessee

public schools. The Statistical Package for Social Sciences (SPSS) software was used to analyze the data. In order to process the raw data, Likert scale rating values of one (1) to five (5) were employed to score the responses in different parts of the questionnaire.

Development of the Questionnaire

For the purpose of this study, the instrument used to collect data was borrowed from the one constructed by Lane, Wilke, Champeau, and Sivek in 1993 for the State of Wisconsin. Some minor changes were made so that the survey would be more relevant and applicable to the State of Tennessee. Questions were added to obtain information about gender, name of school, and district where the teacher were currently teaching, and whether the school was in a rural, suburban, or urban area, but the overall format of the questionnaire remained the same. The questionnaire was administered to a randomly selected pool of elementary and middle school teachers of East Tennessee public school systems.

Lane et al., (1993) reported that the instrument's content- and construct-related validity was established by a panel of sixteen professional environmental educators made up of elementary and secondary teachers who were judged by the research committee to be environmentally literate.

The main challenge that researchers face in using surveys is to establish the assurance that the instrument developed for the purpose of a specific study is both valid and reliable (Oppenheim, 1966). Reliability is defined as "the level of internal consistency or stability of the measuring device over time" (Borg and Gall, 1989). In other words, the instrument should provide the same results consistently over time (Green, 1977; Ary et al., 1990).

The reliability of Lane et al's instrument was assessed by administering the questionnaire to 78 teachers who participated in a pilot study. Cronbach's alpha (α) was used to determine the instrument's reliability. Two subscales were used to evaluate reliability: Teacher Environmental Education Competencies (α=.8466) and Teacher Attitudes (α=.8950). According to Lane et al., the results supported the reliability of the instrument. In other words, each item of the survey instrument consistently measured teachers' perceptions regarding their competencies in, and attitudes toward, environmental education. It is important to note that the test of reliability alone without the test of validity of an instrument can result in "consistently measuring the wrong thing" (Ary et al., 1990).

The validity of an instrument refers to its ability to measure what it is designed to measure. According to Borg and Gall (1989), invalid instruments can lead to erroneous research conclusions. Lane, et al., (1993), who also served on an advisory panel that included members skilled in statistics, instrument development, and environmental research and instruction, reported that a validity panel comprised of sixteen environmental educators was formed to assess content- and construct-related validity of the instrument.

According to Green (1970), the construct validity of an instrument "reflects its effectiveness in assessing the personality traits or intellectual factors that have been selected for measurement." In empirical studies, the instrument should be able to discriminate between a population which possesses the traits that have been selected for measurement and one which does not possess these traits (Oppenheim, 1966; Borg & Gall, 1983; Ary, Jacobs, and Razavich, 1990). Leedy (1989) defines content validity as "the accuracy with which an instrument measures the factors or situations under study."

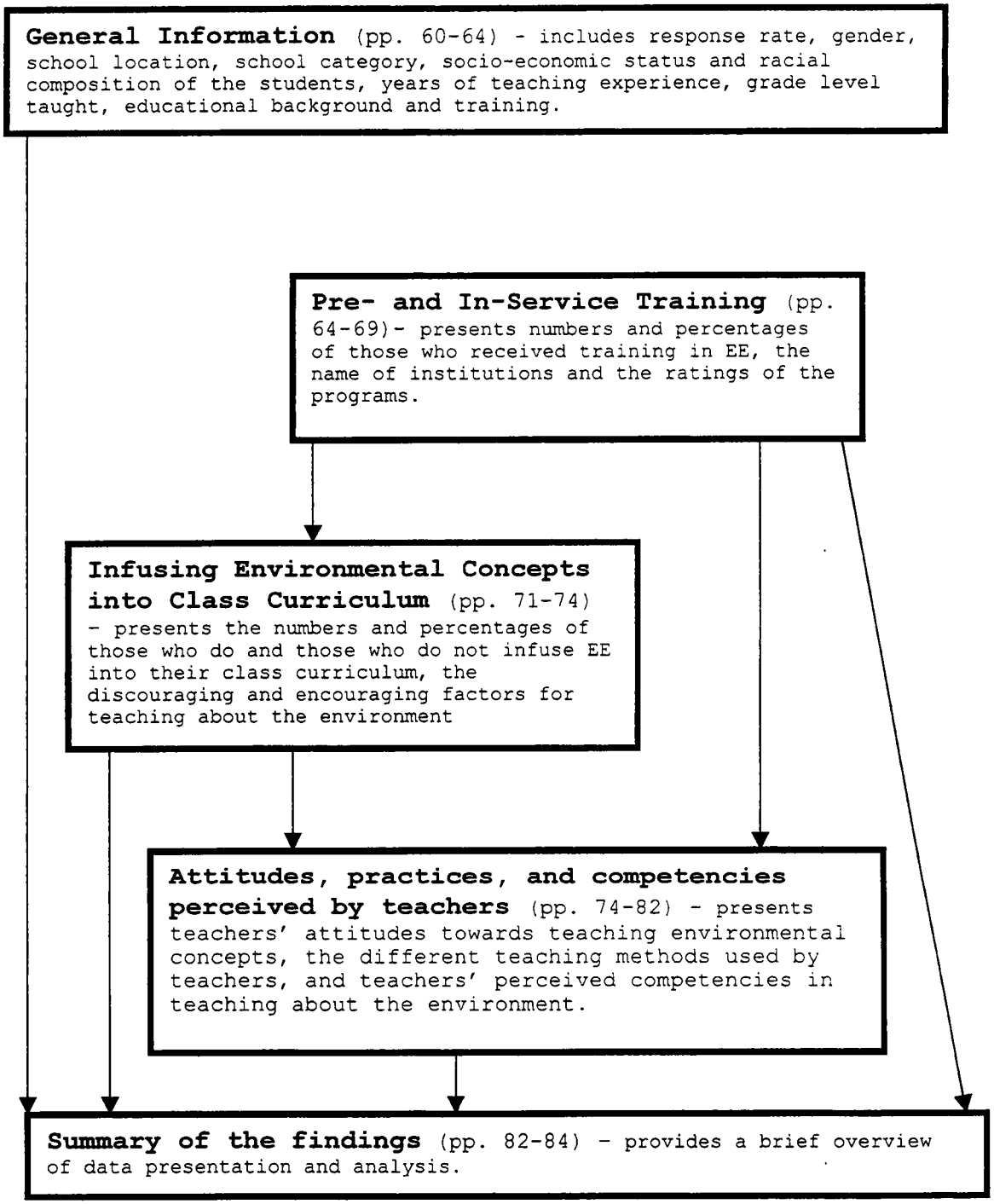
Procedures for Collecting Data

A mail survey was used to collect the data for this study. The researcher sent each selected teacher a package

containing a letter of introduction, a copy of the questionnaire, and a pre-stamped return envelope. Finally a one-dollar bill was included as a token of appreciation to three hundred (300) teachers randomly selected from the pool of 958 randomly selected teachers. According to Sudman and Bradburn (1982), sending money with a questionnaire is an effective method for increasing response rate. However, they found that one-dollar is the maximum amount that motivates people to respond to any questionnaire sent to them. In order to track respondents and follow-up with non-respondents, each questionnaire was pre-coded. The selected teachers were assured confidentiality in the letter sent to them. The first mailing of the questionnaire was sent to the selected teachers by November 22nd, 1998. Then, by December 5th, 1998, those subjects who did not respond were sent another questionnaire and a letter stressing the value of their participation in this study. A week later a post card was sent to all those who received the second mailing.

OVERVIEW CHAPTER IV

PRESENTATION and ANALYSIS of DATA



CHAPTER IV

PRESENTATION and ANALYSIS of DATA

This chapter presents and analyzes data derived from the responses to the questionnaire, which dealt with teachers' perceptions of the current status of environmental education in elementary and middle schools in East Tennessee public school systems.

The data for this study are presented as follows: (a) General information (including gender, school location, school category, socio-economic status and racial composition of the students, years of teaching experience, grade level taught, educational background and training; (b) Infusion of education about the environment into class curriculum; (c) Attitudes, practices, and competencies perceived by teachers; and (d) Summary of the findings.

A total of 958 elementary and middle school teachers were surveyed. They were randomly selected from 316 schools in 33 East Tennessee public school systems. Four hundred thirty (432) teachers returned their questionnaires. The response rate for the survey was 45 percent. The overall response rate was 49 percent, including 134 deemed not useable due to incomplete data, 298 completed and useable, and 36 returned questionnaires as either no longer at address or voluntarily refused to participate.

General Information

Data pertinent to teachers' background information were obtained from the respondents in order to get a better understanding of the population surveyed.

Of the 298 respondents, 261 (88.2%) were female, and 35 (11.8%) were male. Two surveys were returned with no response to the question. Of the 298 teachers, 49 (17%) were teaching in urban schools, 100 (34.6%) in suburban schools, and 140 (48.4%) in rural schools. Nine (3%) teachers did not respond to the question (Table 1).

Table 1

Types of schools

		Frequency	Percent	Valid Percent
Valid	Urban	49	16.4	17.0
	Suburban	100	33.6	34.6
	Rural	140	47.0	48.4
	Total	289	97.0	100.0
Missing	System	9	3.0	
Total		298	100.0	

One hundred ninety-five (68.9%) were elementary school teachers, and 88 (31.1%) were middle/intermediate school teachers. Tables 2 and 3 describe the socio-economic status, and the racial composition of the students in the schools in which the teachers were surveyed.

Table 2

Socio-economic status of the students.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	lower	50	16.8	17.4	17.4
	lower-middle class	124	41.6	43.1	60.4
	middle class	79	26.5	27.4	87.8
	upper-middle class	30	10.1	10.4	98.3
	upper class	5	1.7	1.7	100.0
	Total	288	96.6	100.0	
Missing	System	10	3.4		
Total		298	100.0		

Table 3

Racial composition of schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	mostly african-american	16	5.4	5.4	5.4
	all african-american	1	.3	.3	5.7
	about equally integrated	12	4.0	4.0	9.8
	mostly white	217	72.8	73.1	82.8
	all white	51	17.1	17.2	100.0
	Total	297	99.7	100.0	
Missing	System	1	.3		
Total		298	100.0		

Thirty-four of the teacher respondents (11.4%) have been teaching in their current district from one to five years, 53 (17.8%) from six to ten years, 96 (32.4%) from eleven to twenty years, and 115 (38.6%) have been teaching in their district over twenty-one years. 15 respondents did not respond to the question. Since the teachers surveyed were elementary and middle school teachers, it was possible that they would teach more than one subject and sometimes different grade levels (Tables 4 and 5).

Table 4

Content area taught by respondents

	yes	
	Count	%
Reading	226	75.8%
Language Arts	218	73.2%
Science	191	64.1%
Social Studies	199	66.8%
Health Education	135	45.3%
Physical Education	24	8.1%
English	173	58.1%
Mathematics	211	70.8%
Arts	98	32.9%
Citizenship & Moral Edu.	118	39.6%
Music	32	10.7%

Table 5

Grade levels taught by respondents

	no		yes	
	Count	%	Count	%
K	262	87.9%	36	12.1%
1st grade	249	83.6%	49	16.4%
2nd grade	257	86.2%	41	13.8%
3rd grade	261	87.6%	37	12.4%
4th grade	263	88.3%	35	11.7%
5th grade	258	86.6%	40	13.4%
6th grade	254	85.2%	44	14.8%
7th grade	250	83.9%	48	16.1%
8th grade	243	81.5%	55	18.5%

When asked if environmental education should be taught only in science classes, 221 (77.8%) respondents said no.

Pre-service Training

Only eleven of the respondents named the University of Tennessee at Knoxville as the institution where they received environmental education courses (Table 6).

Of the 298 respondents, only 52(17.4%) indicated receiving pre-service training in environmental education. Two teachers returned their survey with no response to the question.

Table 6

Name of institutions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bryan College	1	.3	2.5	2.5
	Butler University, IN	1	.3	2.5	5.0
	Carson-Newman College	2	.7	5.0	10.0
	Chattanooga State	1	.3	2.5	12.5
	David Lipscomb Univ.	1	.3	2.5	15.0
	E. T. S. Univ.	4	1.3	10.0	25.0
	M.T.S.Univ.	1	.3	2.5	27.5
	Maryville College	2	.7	5.0	32.5
	Northern IN Univ.	1	.3	2.5	35.0
	Ohio State Univ.	1	.3	2.5	37.5
	T.T. Univ.	2	.7	5.0	42.5
	TN Wesley College	1	.3	2.5	45.0
	UT-Chattanooga	11	3.7	27.5	72.5
	UT-Knoxville	11	3.7	27.5	100.0
	Total	40	13.4	100.0	
Missing		258	86.6		
Total		298	100.0		

Of the forty-four who rated the effectiveness of the training in preparing them to teach about the environment, 38 (86.4%) respondents rated the training as very effective to somewhat effective, 4 (9.1%) were not sure, and 4 (4.5%) rated their training as very ineffective (Table 7).

Teachers were asked to rate the effectiveness of their pre-service training with regard to preparing them to teach about the environment using cognitive and affective methods.

One hundred fifty-seven (56.5%) respondents indicated that their pre-service teacher education program did not effectively prepare them in using cognitive education methods to teach about the environment. One hundred sixty-three (58.8%) respondents indicated that their pre-service training did not effectively prepare them to use affective education methods to help students examine their values relating to environmental issues. One hundred sixty-nine (60.8%) respondents indicated that their pre-service teacher education program was not effective in providing strategies they could use to give students experience in resolving environmental issues (Table 8).

In-Service Training

Ninety-three (31.4%) of the respondents indicated that they received in-service training in environmental education.

Table 7

Effectiveness of Pre-service programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very effective	4	1.3	9.1	9.1
	somewhat effective	34	11.4	77.3	86.4
	not sure	4	1.3	9.1	95.5
	very ineffective	2	.7	4.5	100.0
	Total	44	14.8	100.0	
Missin	System	254	85.2		
Total		298	100.0		

Table 8

Effectiveness of pre-service training with regard to preparing teachers to teach about the environment using cognitive, affective and action strategy methods

	no		yes		not sure	
	Count	%	Count	%	Count	%
My pre-service training was effective at preparing me to use cognitive education methods to teach students about the environment.	157	56.5%	64	23.0%	57	20.5%
My pre-service training effective at preparing me to use affective education methods to help students examine values relating to environmental issues.	163	58.8%	73	26.4%	41	14.8%
My pre-service training was effective at providing me with strategies I can use to give students experience in resolving environmental issues.	169	60.8%	67	24.1%	42	15.1%

Thirty-eight percent (38.2%) of the respondents experienced environmental education in-service training through workshops, 33.2 percent through field trips, 22.1% through lectures, 20.1% through demonstration training, 9.4% through conferences or seminars, and 8.1% through environmental education courses taken in colleges or universities.

The respondents indicated that in-service training programs in environmental education addressed environmental education content knowledge (36%), environmental education teaching methods (26%), field trip guidance (22%), and preparation of teaching materials (14%).

Of the ninety-four who rated the effectiveness of the training in preparing them to teach about the environment, 68 (93.6%) rated the training as very effective to somewhat effective, 4 (4.3%) were not sure, and 2 (2.1%) rated their training as very ineffective (Table 9).

Forty out of the 56 respondents (71%) indicated they had less than three post-graduate environmental education courses (Table 10). Ninety-eight (35.4%) respondents indicated that their in-service teacher education program effectively prepared them in using cognitive education methods to teach about the environment.

Table 9

Effectiveness of In-service programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very effective	28	9.4	29.8	29.8
	somewhat effectiv	60	20.1	63.8	93.6
	not sure	4	1.3	4.3	97.9
	very ineffective	2	.7	2.1	100.0
	Total	94	31.5	100.0	
Missing	System	204	68.5		
Total		298	100.0		

Table 10

Post-graduate EE courses taken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	20	6.7	35.7	35.7
	2.00	20	6.7	35.7	71.4
	3.00	8	2.7	14.3	85.7
	4.00	3	1.0	5.4	91.1
	5.00	4	1.3	7.1	98.2
	6.00	1	.3	1.8	100.0
	Total	56	18.8	100.0	
Missing	System	242	81.2		
Total		298	100.0		

Ninety-seven (49.3%) respondents reported that their in-service training effectively prepared them to use affective education methods to help students examine their values relating to environmental issues. One hundred-two respondents (37.4%) indicated that their in-service teacher education program was effective at providing strategies they could use to give students experience in resolving environmental issues (Table 11).

Types of Environmental Education Programs

One hundred eighty-nine (63.6%) respondents reported that their school had some type of environmental education program.

Table 11

Effectiveness of in-service training with regard to preparing teachers to teach about the environment using of cognitive, affective and action strategy methods

	no		yes		not sure	
	Count	%	Count	%	Count	%
My in-service training was effective at preparing me to use cognitive education methods to teach students about the environment.	130	46.9%	98	35.4%	49	17.7%
My in-service training was effective at preparing me to use affective education methods to help students examine values relating to environmental issues.	137	49.5%	97	35.0%	43	15.5%
My in-service training was effective at providing me with strategies I can use to give students experience in resolving environmental issues.	135	49.5%	102	37.4%	36	13.2%

Eight (2.7%) teachers did not respond to the question. Recycling activities and field trips were at the top of environmental education programs reported by the teachers.

Infusing Environmental Concepts into Class Curriculum

To avoid any confusion, the respondents were given a clear definition of infusion of education about the environment (see Appendix, p.79). One hundred seventy-seven (59.4%) of the respondents reported currently infusing environmental education concepts into their class curriculum. One hundred-one (33.9%) of the respondents indicated they were not currently infusing environmental concepts into their class curriculum (Table 12).

Table 12

Infusion of environmental education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	101	33.9	33.9	33.9
	yes	177	59.4	59.4	93.3
	not sure	20	6.7	6.7	100.0
	Total	298	100.0	100.0	

a) Discouraging Factors

Teachers who reported not infusing environmental concepts were asked to indicate why they do not teach about the environment and in what circumstance they would most likely infuse environmental concepts into their classroom. They were asked to indicate their agreement or disagreement with a list of reasons for not infusing environmental concepts into their classroom teaching. Eighty-two (72.6%) respondents reported Lack of resources/funding as the primary factor preventing them from infusing environmental concepts in their subjects. Not enough preparation time was the second factor stated by 80 (70.1%) respondents as important.

Seventy-eight (67%) respondents indicated not having enough class time as a factor that prevent them from incorporating education about the environment into their lessons. Lack of knowledge or background to teach about the environment was the fourth factor stated by 58 (50.4%) respondents as preventing them from infusing environmental concepts into their classroom teaching.

Only seven (6.5%) respondents indicated that environmental concepts were not appropriate for the grade level they taught, and Seventy-four (67.8%) indicated that they disagreed with the statement that they are not

interested in teaching about the environment as a reason for not infusing environmental concepts into their classroom (Table 13).

b) Influencing Factors

When asked what would encourage them to teach about the environment, 97 (81.5%) of the respondents selected better access to resources/aids for teaching environmental education. The second most frequent response given by 90 (75.9%) respondents was more preparation time. The third most common response given by 89 (75.9%) respondents was more funding. More in-service classes on environmental education methods was given as the fourth response by 80 (67.9%) respondents (Table 14).

Table 13

Discouraging Factors

	strongly disagree		disagree		undecided		agree		strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
I am not interested...	31	28.2%	44	40.0%	19	17.3%	12	10.9%	4	3.6%
Do not have the class time	3	2.6%	23	19.8%	12	10.3%	44	37.9%	34	29.3%
Not enough preparation class time	1	.9%	23	20.2%	10	8.8%	51	44.7%	29	25.4%
Not enough resources or fundings			16	14.2%	15	13.3%	49	43.4%	33	29.2%
Unrelatedd to my subject area	9	7.9%	53	46.5%	15	13.2%	20	17.5%	17	14.9%
School setting not conducive...	13	11.9%	67	61.5%	20	18.3%	8	7.3%	1	.9%
Not appropriate for grade...	25	23.1%	69	63.9%	7	6.5%	6	5.6%	1	.9%
Do not have the knowledge....	7	6.1%	27	23.7%	22	19.3%	53	46.5%	5	4.4%
Other concepts more important...	8	7.1%	23	20.5%	30	26.8%	38	33.9%	13	11.6%

Table 14

Influencing Factors

	strongly disagree		disagree		undecided		agree		strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
More administration support	9	7.8%	29	25.0%	28	24.1%	42	36.2%	8	6.9%
More in-service on EE teaching methods	5	4.2%	15	12.6%	19	16.0%	61	51.3%	19	16.0%
Better access to resources/aids for teaching EE	2	1.7%	8	6.7%	12	10.1%	72	60.5%	25	21.0%
More preparation time	3	2.5%	15	12.6%	11	9.2%	61	51.3%	29	24.4%
More funding	2	1.7%	13	11.1%	13	11.1%	51	43.6%	38	32.5%

Attitudes, Practices and Competencies

The purpose of this section was to assess teachers' attitudes, practices and competencies as it relates to environmental education.

a) Attitudes

Teachers' attitudes and teaching practices were assessed using five-point Likert-type scales. The respondents were asked to rate their levels of agreements or disagreement with statements regarding their attitudes toward environmental education and reasons for teaching environmental concepts into their classroom.

One hundred fifty-nine (96.9%) respondents agreed that it is important to take time to integrate environmental concepts and issues into any subject or grade level. One hundred fifty-eight (96.9%) respondents agreed that teachers should help students develop a set of values and feelings of concern for the environment, and one hundred fifty (91.5%) respondents agreed that teachers should

provide students with the opportunities to gain actual experience in solving environmental issues. One hundred twenty-one (73.8%) respondents agreed that environmental education should be considered a priority in the K-8 educational system. One hundred seven (66%) respondents agreed that pre-service teachers should be required to take environmental education method courses (Table 15). On the other hand, only 7 (4.4%) respondents indicated that the main reason they teach about the environment is because it is mandated. Based on these results, teachers' overall attitudes toward environmental education were positive.

Table 15

Teachers' perceived attitudes

	strongly disagree		disagree		undecided		agree		strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
The main reason I teach about the environment because it is mandated	52	33.1%	92	58.6%	6	3.8%	6	3.8%	1	.6%
EE should be considered a priority in our K-8 educational system	2	1.2%	12	7.3%	29	17.7%	98	59.8%	23	14.0%
I believe it is important to take tim to integrate environmental concepts and issues into any subject or grade level	1	.6%	0	.0%	4	2.4%	124	75.6%	35	21.3%
Pre-service teachers should be required to take EE methods courses	2	1.2%	11	6.8%	42	25.9%	89	54.9%	18	11.1%
I am effective at infusing the study of environmental concepts into my subject or grade level	0	.0%	5	3.1%	45	27.6%	102	62.6%	11	6.7%
A goal of my teaching is to increase students' level of environmental responsibility	0	.0%	7	4.3%	12	7.3%	111	67.7%	34	20.7%
Teachers should provide students with opportunities to gain actual experience in solving environmental issues	0	.0%	2	1.2%	12	7.3%	123	75.0%	27	16.5%
Teachers should help students develop a set of values and feelings of concern the environment	1	.6%	0	.0%	4	2.5	105	64.4%	53	32.5

Although teachers exhibited a positive attitude towards environmental education, they indicated spending less than 30 minutes per subject per week teaching about the environment (Table 16). About 78 percent of the respondents spent less than 5 to 14 percent of their instructional time infusing environmental concepts and issues into their curriculum.

b) Practices

1) Cognitive Education methods

When presented with a list of cognitive education methods that could be used to increase knowledge of ecological foundations and environmental issues and to develop skills which can be used to help resolve environmental issues. Teachers agreed that most of the listed cognitive education methods were valuable.

Table 16

Class time devoted to environmental education

		Frequency	Percent	Valid Percent
Valid	less than 30 minutes	131	44.0	79.4
	31-60	26	8.7	15.8
	61-90	4	1.3	2.4
	91-120	2	.7	1.2
	121-150	1	.3	.6
	181-210	1	.3	.6
	Total	165	55.4	100.0
Missing	System	133	44.6	
Total		298	100.0	

Field trips, problem solving/critical thinking, experiments, guided discovery, community resources, independent/group projects and cooperative learning were rated high. Lectures and case studies received the lowest mark. However, the respondents reported they used lectures, case studies, and other low rated methods effectively to teach about the environment (Table 17).

2) Affective Education Methods

When asked to evaluate affective education methods that could be used to examine attitudes and values inherent to environmental issues, respondents agreed that most of the listed affective education methods were valuable. Teachers reported that they used most of the affective education methods listed (Table 18). The three methods that respondents reported they used the most were sensory or awareness, behavior modification and moral development activities. Inculcation method had the lowest rate.

3) Environmental Action Strategies

This section referred to categories of actions which individuals or groups could use to resolve environmental problems. The description of each category was provided to the respondents.

Table 17

Cognitive Education Methods used effectively

	no		yes	
	Count	%	Count	%
outdoor teaching	27	16.1%	141	83.9%
guided discovery	44	26.7%	121	73.3%
lectures	30	18.3%	134	81.7%
experiments	45	27.3%	120	72.7%
role playing and dramatizations	79	48.5%	84	51.5%
problem-solving/critical thinking	42	25.8%	121	74.2%
case studies	126	77.8%	36	22.2%
data gathering and analysis	78	47.6%	86	52.4%
audiovisuals	24	14.5%	141	85.5%
environmental issue investigating	108	66.7%	54	33.3%
simulations	110	67.5%	53	32.5%
self-directed learning	68	41.7%	95	58.3%
cooperative learning	30	18.0%	137	82.0%
computer-oriented activities	100	61.3%	63	38.7%
assignments in writing	55	33.5%	109	66.5%
independent or group projects	48	29.3%	116	70.7%
community resource use	50	30.7%	113	69.3%
observations	29	19.3%	121	80.7%

Table 18

Affective Education Methods used effectively

	no		yes	
	Count	%	Count	%
Sensory/ awareness activities	35	21.2%	130	78.8%
Behavior modification	76	46.6%	87	53.4%
Moral development activities	54	33.5%	107	66.5%
Inculcation	125	78.6%	34	21.4%
Values clarification	65	40.6%	95	59.4%
Values analysis	85	53.5%	74	46.5%

Ninety-two (58.2%) respondents reported they involved students in action strategies (Table 19). Of the respondents, sixty-six (43.7%) respondents reported that lack of time was the main reason for not involving students in environmental action. Fifty-two (34%) respondents indicated that environmental action was not appropriate for the grade level they taught.

Teachers' Perceived Competencies

Teachers' perceived competencies in teaching about environmental concepts using cognitive education, affective education methods, and environmental action strategies were assessed using five-point Likert-type scales. One hundred forty-one (83%) respondents agreed that as result of attending their class, students were more aware of the impact their individual or group behaviors have on the environment. One hundred thirty-one (78.6%) agreed that students were more aware of environmental concepts and issues as a result of taking their class. Yet, only 73 (43%) respondents indicated they were effective at teaching the skills needed to resolve environmental problems (Table 20).

Table 19

Involving students in environmental action

		Frequency	Percent	Valid Percent
Valid	no	62	20.8	39.2
	yes	92	30.9	58.2
	not sure	4	1.3	2.5
	Total	158	53.0	100.0
Missing	System	140	47.0	
Total		298	100.0	

Table 20

Perceived EE competencies in using cognitive education methods

	strongly disagree		disagree		undecided		agree		strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
As result of my class, students are aware of environmental concepts and issues	0	.0%	6	3.5%	30	17.6%	121	71.2%	13	7.6%
As a result of attending my class, students are more knowledgeable of ecological foundations and environme issues	0	.0%	11	6.5%	42	24.7%	99	58.2%	18	10.6%
I am effective at teaching the skill needed to resolve environmental issu	1	.6%	16	9.4%	80	47.1%	69	40.6%	4	2.4%
As a result of attending my class, students are more aware of the impac their individual behaviors have on t environment	0	.0%	4	2.4%	25	14.7%	121	71.2%	20	11.8

One hundred twenty-nine (77.3%) respondents reported that students were more sensitive toward the environment as a result of attending their class. One hundred eight (65.4%) indicated that as a result of taking their class, students understood better the roles that values play in environmental issues. Only 59% of the respondents agreed that students had a better understanding about their beliefs, attitudes, and values regarding environmental issues (Table 21). Ninety-seven (61%) respondents indicated

that students were more aware of the need to become involved in resolving environmental problems as a result of attending their class. Eighty-seven (54.4%) teachers agreed that students gained positive experience in resolving environmental problems. However, only 51 (31.4%) respondents reported they were effective at teaching students how to use environmental action strategies to resolve environmental problems (Table 22).

Table 21

EE competencies in using affective education methods

	strongly disagree		disagree		undecided		agree		strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
As a result of attending my class, student better understand the role that values play in environmental issues.	1	.6%	11	6.7%	45	27.3%	100	60.6%	8	4.8%
I believe students are more sensitive toward the environment a a result of attending my class.	0	.0%	6	3.6%	32	19.2%	117	70.1%	12	7.2%
Students have a better understanding about their beliefs, attitudes, and values regarding environmental issues as result of attending my class.	1	.6%	7	4.2%	60	36.1%	90	54.2%	8	4.8%

Table 22

EE competencies in using environmental action strategies

	strongly disagree		disagree		undecided		agree		strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
After attending my class, students a aware of the need to become involved in resolving environmental issues	2	1.3%	13	8.2%	47	29.6%	91	57.2%	6	3.8%
As a result of taking my class, students have gained positive experience in resolving environmenta issues.	2	1.3%	14	8.8%	57	35.6%	81	50.6%	6	3.8%
I am effective at teaching students how to use action strategies to resolve environmental issues.	3	1.9%	19	11.9%	87	54.4%	47	29.4%	4	2.5%

One hundred forty-one (88.7%) teachers believed that their instruction did contribute to the development of environmentally literate citizens (Table 23).

Summary of the Findings

The purpose of this study was to investigate the status of environmental education in elementary and middle schools in East Tennessee public schools as perceived by elementary and middle school teachers.

A questionnaire developed in Wisconsin was used in this research to answer the research questions stated in Chapter I. The reliability and validity of the questionnaire were examined.

For the purpose of this research, a total of 958 elementary and middle school teachers were surveyed. They were randomly selected from 316 schools in 33 East Tennessee public school systems. The survey was administered to the research sample during the 1998-99 school year. Four hundred thirty-two (432) teachers returned their questionnaires. The response rate for the survey was 45 percent.

The overall response rate was 49 percent, including 133 deemed not useable due to incomplete data, 279 completed and useable, and 36 returned questionnaires as either no longer at address or voluntarily refused to participate.

Table 23

The development of environmentally literate citizens

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	18	6.0	11.3	11.3
	yes	141	47.3	88.7	100.0
	Total	159	53.4	100.0	
Missing	System	139	46.6		
Total		298	100.0		

Descriptive statistics were used to analyze the data collected through the survey questionnaire.

Two hundred sixty-one (88.2%) of the respondents were female and thirty-five (11.8%) were male. The majority of the respondents (115) have been teaching in their current district over twenty-one years.

Two hundred forty-six (82.6%) of the respondents reported they did not receive pre-service training in environmental education, and two hundred three (68.6%) of the respondents indicated they did not receive in-service training in environmental education. A large number of the respondents indicated that the pre- and in-service training did not effectively prepare them to teach about the environment.

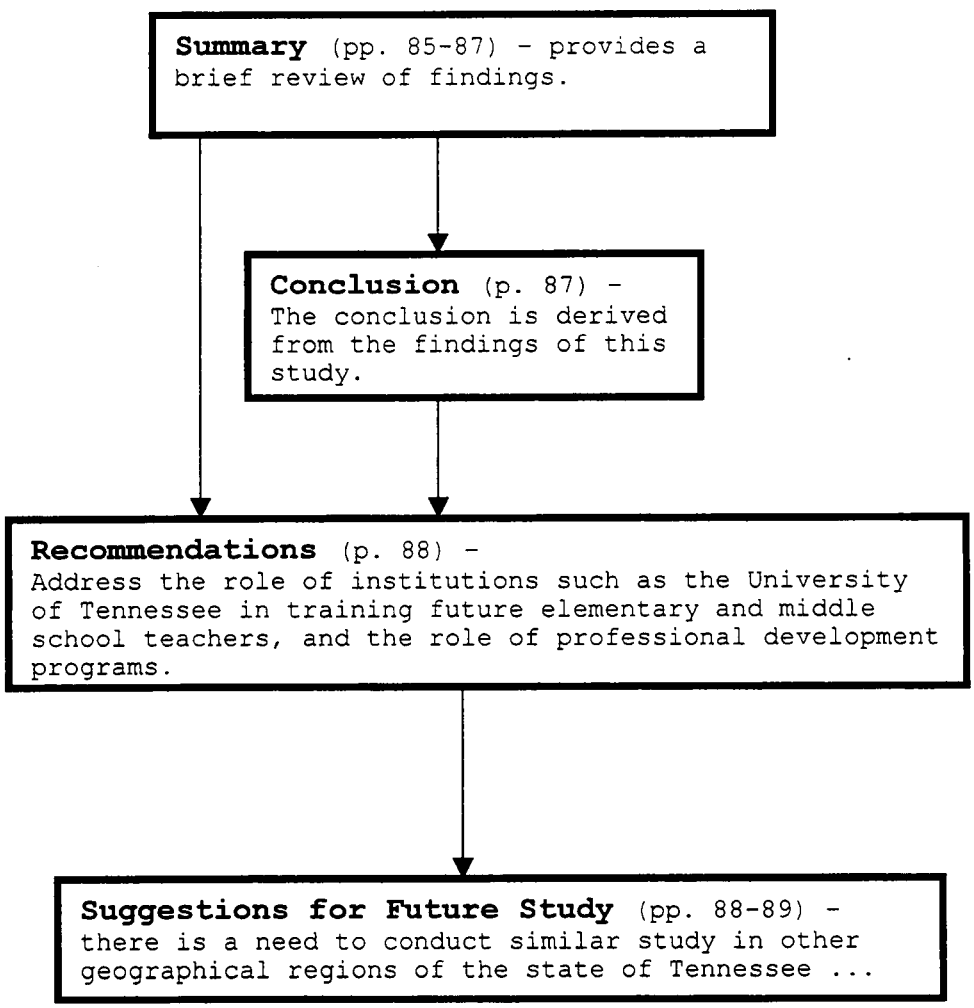
About sixty percent (60%) of the respondents indicated they currently infuse environmental education into their classroom curriculum. Over thirty (30%) of the respondents

were not infusing environmental concepts into their classroom teaching. The respondents indicated that (1) lack of resources/funding; (2) not enough preparation time; (3) not enough class time, and (4) lack of knowledge or EE background were the primary reasons that prevented them from infusing environmental concepts into their classrooms. The respondents indicated also that (1) better access to resources/aids for teaching EE; (2) more funding; (3) more preparation time; and (4) more in-service training on environmental education methods were the factors that would influence them to teach about the environment.

Although teachers exhibited positive attitudes toward environmental education, forty-four percent of the respondents indicated that they spent less than thirty minutes per subject per week teaching about the environment. However, eighty-eight percent of the respondents believed that their instruction did contribute to the development of environmentally literate citizens.

OVERVIEW CHAPTER V

SUMMARY, CONCLUSION, RECOMMENDATIONS and SUGGESTIONS



CHAPTER V

SUMMARY, CONCLUSION, RECOMMENDATIONS and SUGGESTIONS

This chapter concludes the findings derived from this study. Summary, recommendations and suggestions for future study are also presented.

Summary

1) Over two thirds of the respondents were females. The majority of the respondents (115) had been teaching in their current district over twenty-one years.
2) Over two thirds of the respondents indicated that they did not receive environmental education courses in their pre-service training in colleges or universities. The teachers who received environmental education courses in pre-service training gave high marks to the effectiveness of the training in preparing them to teach about the environment.
3) Over two thirds of the respondents never attended environmental education in-service programs. The teachers who participated in teachers' developmental programs in environmental education rated them high in the effectiveness of the training in preparing them to teach environmental concepts.
4) According to respondents, in-service training programs in environmental education addressed environmental

education content knowledge (36%), environmental education teaching methods (26%), field trip guidance (22%), and preparation of teaching materials (14%).

5) Most of the respondents experienced environmental education in-service training through workshops (38.9%), field trips (33.2%), lectures (22.1%), demonstration training (20.1%), conferences or seminars (9.4%), and environmental education courses taken in colleges or universities (8.1%).
6) More than 70 percent of respondents did not agree with the statement that environmental concepts should be taught only in science classes.
7) The respondents indicated that (1) lack of resources/funding; (2) not enough preparation time; (3) not enough class time, and (4) lack of knowledge or EE background were the primary reasons that prevented them from infusing environmental concepts in their classrooms.
8) The respondents indicated also that (1) better access to resources/aids for teaching EE; (2) more funding; (3) more preparation time; and (4) more in-service training on environmental education methods were the factors that would influence them to teach about the environment.

9) Approximately seventy-three percent of the teachers indicated that environmental education should be considered a priority in any K-8 educational system.
10) Eighty-eight percent of the respondents believed that their instruction did contribute to the development of environmentally literate citizens.
11) There was a strong interest among the respondents in teaching environmental concepts in their classrooms.

Conclusion

Most teacher education programs in East Tennessee are not providing environmental education courses to pre- and in-service teachers who, in general, have positive attitudes toward teaching environmental education concepts in elementary and middle schools.

Teachers in East Tennessee generally are not equipped with the knowledge and skills needed to successfully integrate environmental education into their curricula.

The minimum teacher certification requirements should include environmental education courses that address how to integrate environmental concepts into different subjects at all grade levels in elementary and middle schools.

Recommendations

Institutions such as The University of Tennessee, which produces many of the teachers in the state of Tennessee should take a proactive role in training future elementary and middle school teachers by offering courses related to environmental education teaching methods.

Professional development programs in East Tennessee school systems should offer environmental education in-service training to elementary and middle school teachers who would like to update their knowledge, skills, and practices.

The development and distribution of environmental education teaching materials should be integrated in pre- and in-service environmental education training in institutions such as the College of Education at the University of Tennessee.

Suggestions for Future Study

Since the population of this study was limited to elementary and middle schools in East Tennessee, a similar study in other geographical regions could be undertaken to gain more understanding of other teachers' perceptions about environmental education in Tennessee.

Since teachers education programs are not providing environmental educations to pre- and in-service teachers,

a study to determine the factors that prevent or encourage programs to integrate environmental education into the curriculum could also be undertaken.

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APPENDICES

APPENDIX A

STATUS OF ENVIRONMENTAL EDUCATION IN ELEMENTARY AND MIDDLE PUBLIC SCHOOLS OF EAST TENNESSEE: A TEACHER PERSPECTIVE

THE SURVEY and LETTERS

- Final survey
- Initial cover letter
- Follow-up letter
- Reminder postcard

Code_____

"Status of environmental education in elementary and middle public schools of East Tennessee: A teacher perspective."

SECTION 1

General Information

Q-1 Gender. (Circle number)

1 Male
2 Female

Q-2 Which term BEST describes your school? (Circle number)

1 Urban
2 Suburban
3 Rural

Q-3 Which category BEST describes the school in which you teach? (Circle number)

1 Elementary
2 Middle/Intermediate
3 Other (specify)_____

Q-4 Which category BEST describes the socio-economic status of the students enrolled in your school? (Circle number)

1 Upper class
2 Upper-middle class
3 Middle class
4 Lower-middle class
5 Lower class
6 Other (specify)_____

Q-5 Which category BEST describes the racial composition of the school in which you teach? (Circle number)

1 All White
2 Mostly White.
3 About equally integrated
4 All African-American
5 Mostly African-American
6 Other_____

Q-6 How many years have you been teaching in your current district?(Circle number)

1 1 – 5 years
2 6– 10 years
3 11 – 20 years

4 Over 21 years

Q-7 **In what year did you receive your Tennessee teaching certificate_____**

Q-8 **What is (are) your area(s) of certification? (Circle number)**

1 Elementary

2 Middle/Intermediate

3 Other

(specify)_____

Q-9 **Circle the grade level(s) you teach: K 1 2 3 4 5 6 7 8**

Q-10 **Please indicate the content area(s) you teach (Circle all numbers that apply)**

1	Reading	7	English
2	Language Arts	8	Mathematics
3	Science (specify)_____	9	Arts
4	Social Studies	10	Citizenship & Moral Education
5	Health Education	11	Music
6	Physical Education	12	Other

(specify)_____

Q-11 **During your pre-service teacher education training, did you receive Environmental Education course(s)? (Circle number)**

1 No Go to **Q-13**

2 Yes Please write the name of the institution_____

Q-12 **Rate the general value of your pre-service Environmental Education course(s) with regard to effectiveness in preparing you to teach about the environment. (Circle number)**

1 Very effective

2 Somewhat effective

3 Not sure

4 Very ineffective

Q-13 **My pre-service teacher education program effectively prepared me in using cognitive education methods to teach students about the environment. (Circle number)**

1 No

2 Yes

3 Not sure

Q-14 **My pre-service teacher education program effectively prepared me to use affective education methods to help students examine their values relating to environmental issues. (Circle number)**

1 No

2 Yes

3 Not sure

Q-15 **My pre-service teacher education was effective at providing me with strategies I can use to give students experience in resolving environmental issues. (Circle number)**

1 No

2 Yes

3 Not sure

Q-16 **Have you received Environmental Education (EE) in-service or taken post-graduate or graduate coursework relating to environmental education or teaching about the environment? (Circle number)**

1 No Go to **Q-18**
2 Yes How many courses have you taken?_____

Q-17 **Rate the general value of your in-service in EE with regard to effectiveness in preparing you to teach about the environment. (Circle number)**

1 Very effective
2 Somewhat effective
3 Not sure
4 Very ineffective

Q-18 **My in-service teacher education effectively prepared me in using cognitive education methods to teach students about the environment. (Circle number)**

1 No
2 Yes
3 Not sure

Q-19 **My in-service teacher education effectively prepared me to us affective education methods to help students examine values relating to environmental issues. (Circle number)**

1 No
2 Yes
3 Not sure

Q-20 **My in-service teacher program was effective at providing me with strategies I can use to give students experience in resolving environmental issues. (Circle number)**

1 No
2 Yes
3 Not sure

Q-21 **What types of Environmental Education in-service training experiences have you had? (Circle all number that apply)**

1 Workshops
2 Lectures
3 Demonstration teaching
4 Field trips
5 EE courses taken in colleges or universities
6 Conferences or seminars
7 Other (specify)_____
8 None

Q-22 **What were the contents of your Environmental Education in-service training experiences? (Circle number)**

1 Environmental education content knowledge
2 Environmental education teaching methods
3 Preparation of teaching material
4 Field trip guidance
5 Other (specify)_____

Q-23 **Does your school district have an Environmental Education Curriculum Plan or Guide? (Circle number)**

1 No

2 Yes

3 Not sure

Q-24 **Do you have a copy of the Plan or Guide? (Circle number)**

1 No
2 Yes
3 Not sure

Q-25 **How often do you refer to the Plan or the Guide? (Circle number)**

1 Daily

2 Weekly

3 Monthly

4 Yearly

5 Never

Q-26 **Does your school have any type of Environmental Education (EE) program? (Circle number)**

1 No
2 Yes **please circle all numbers that apply**

1 EE teaching in regular classes

2 Recycling activities

3 Seminars/conferences

4 Workshops

5 EE activities (fairs/contests)

6 Field trips

7 Lectures

8 Other

(specify)_____

Infusion of education about the environment refers to the integration of environmental concepts and skills into existing courses in a manner as to focus on those concepts and /or skills without jeopardizing the integrity of the original course. The aim is to "environmentalize" the existing course while still meeting the objectives set for the course.

Q-27 **Do you currently infuse education about the environment into your class curriculum? (Circle number)**

1 No (answer **Q-28** through **Q-30 only**).

2 Yes (if you answer **YES** to this question, **DO NOT** answer **Q-28** & **Q-29**. Instead resume responding with **Q-30**).

3 Not sure (answer **Q-28** through **Q-30 only**)

Q-28 **Please use the key below to indicate your agreement or disagreement with the following reasons for NOT infusing environmental concepts into your classroom teaching. (Circle your answer)**

	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
I am not interested in teaching about the environment.	SA	A	U	D	SD
I do not have the class time.	SA	A	U	D	SD
I do not have enough preparation time.	SA	A	U	D	SD
I do not have enough resources or funding.	SA	A	U	D	SD
Environmental concepts are unrelated to my subject area.	SA	A	U	D	SD
My school setting is not conducive to teaching about the environment	SA	A	U	D	SD
Environmental Education is not appropriate for the grade level I teach.	SA	A	U	D	SD
I do not have the knowledge to effectively teach about the environment.	SA	A	U	D	SD
There are concepts other than EE that are more important to infuse into my teaching.	SA	A	U	D	SD

Other (Specify)_____

Q-29 **Using the same key as above, indicate your agreement or disagreement with the following statements regarding whether the situation would most influence you to infuse environmental concepts into your classroom teaching. (Circle your answer)**

• More support from my administration.	SA	A	U	D	SD
• More in-service classes on EE teaching methods.	SA	A	U	D	SD
• Better access to resources/aids for teaching about the environment.	SA	A	U	D	SD
• More preparation time.	SA	A	U	D	SD
• More funding.	SA	A	U	D	SD

Q-30 **Do you think that environmental education should be taught only in science class? (Circle number)**

1 No
2 Yes
3 Not Sure

If you answered "NO" or "NOT SURE" to Q-27, you do not need to complete the rest of the survey. Please return the questionnaire in the stamped envelope provided. Thank you for taking the time to complete this survey. If you answered "Yes" to Question #, please continue to Section 2.

SECTION 2

Environmental Education Attitudes and Practices

The purpose of this section is to assess general attitudes and information regarding your teaching as it relates to Environmental Education (EE).

Q-31 **Please use the key below to indicate your agreement or disagreement with the statement. (Circle your answer)**

	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
• The main reason I teach my students about the environment is because it is mandated.	SA	A	U	D	SD
• EE should be considered a priority in our K-12 educational system.	SA	A	U	D	SD
• I believe it is important to take the time to integrate environmental concepts and issues into my subject or grade level	SA	A	U	D	SD
• Pre-service teachers should be required to take EE methods course.	SA	A	U	D	SD
• I am effective at infusing the study of environmental concepts and issues into my subject or grade level.	SA	A	U	D	SD
• A goal of my teaching is to increase students' level of environmental responsibility.	SA	A	U	D	SD
• Teachers should provide students with opportunities to gain actual experience in solving environmental issues.	SA	A	U	D	SD
• Teachers should help students develop a set of values and feelings of concern for the environmental.	SA	A	U	D	SD

Q-32 **Into which discipline(s) do you infuse environmental concepts?**_____

Q-33 **What percentage of your instructional time includes infusion of environmental concepts and issues? (Circle one number)**

1 Less than 5%

2 5% to 14 %

3 15% to 24%

4 25% to 49%

5 50% or more

Q-34 **For each subject you teach, approximately how much time per week do you spend teaching about the environment? (Circle one number)**

1 Less than 30 minutes

2 31 - 60 minutes

3 61 - 90 minutes

4 91 - 120 minutes

5 121 - 150 minutes

6 151 - 180 minutes

7 181 - 210 minutes

8 211 - 240 minutes

9 Over 240 minutes

Q-35 **For all the subjects that you teach, approximately how much time combined do you spend per week teaching about the environment? (Circle one number that best fits your teaching situation)**

1 Less than 30 minutes

2 31 - 60 minutes

3 61 - 90 minutes

4 91 - 120 minutes

5 121 - 150 minutes

6 151 - 180 minutes

7 181 - 210 minutes

8 211- 240 minutes

9 Over 240 minutes

SECTION 3

Cognitive Education Methods

This section refers to the use of cognitive education methods which can be used to encourage awareness of environmental concepts and problems, to increase knowledge of ecological foundations and environmental issues, and to develop skills which can be used to help resolve environmental issues.

Q-36 Please use the key below to indicate your agreement or disagreement that each of the cognitive education methods listed are VALUABLE for teaching about the environment. (Circle your answer)

	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
Outdoor teaching strategies	SA	A	U	D	SD
Guided discovery	SA	A	U	D	SD
Lectures	SA	A	U	D	SD
Experiments	SA	A	U	D	SD
Role playing and dramatizations	SA	A	U	D	SD
Problem-solving/critical thinking	SA	A	U	D	SD
Case studies	SA	A	U	D	SD
Data gathering and analysis	SA	A	U	D	SD
Audiovisuals (showing videos, movies etc...)	SA	A	U	D	SD
Environmental issue investigating	SA	A	U	D	SD
Simulations	SA	A	U	D	SD
Self-directed learning	SA	A	U	D	SD
Cooperative learning	SA	A	U	D	SD
Computer-oriented activities	SA	A	U	D	SD
Assignments in writing, art, and music	SA	A	U	D	SD
Independent or group projects	SA	A	U	D	SD
Community resource use (guest speakers)	SA	A	U	D	SD
Observations (field trips, demonstrations...)	SA	A	U	D	SD
Other_____	SA	A	U	D	SD

Q-37 Please use the key below to indicate which of the cognitive education methods you have actually used to teach about the environment. (Circle number)

Outdoor teaching strategies	1	No	2	Yes
Guided discovery	1	No	2	Yes
Lectures	1	No	2	Yes
Experiments	1	No	2	Yes
Role playing and dramatizations	1	No	2	Yes
Problem-solving/critical thinking	1	No	2	Yes

Case studies	1	No	2	Yes
Data gathering and analysis	1	No	2	Yes
Audiovisuals (showing videos, movies etc...)	1	No	2	Yes
Environmental issue investigating	1	No	2	Yes
Simulations	1	No	2	Yes
Self-directed learning	1	No	2	Yes
Cooperative learning	1	No	2	Yes
Computer-oriented activities	1	No	2	Yes
Assignments in writing, art, and music	1	No	2	Yes
Independent or group projects	1	No	2	Yes
Community resource use (guest speakers)	1	No	2	Yes
Observations (field trips, demonstrations...)	1	No	2	Yes
Other_____	1	No	2	Yes

Q-38 Please use the key below to indicate your agreement or disagreement with the statement. (Circle your answer)

	Strongly Agree (SA)	**Agree (A)**	**Undecided (U)**	**Disagree (D)**	**Strongly Disagree (SD)**
• As a result of my class, students are more aware of environmental concepts and issues.	SA	A	U	D	SD
• As a result of attending my class, students are more knowledgeable of ecological foundations and environmental issues.	SA	A	U	D	SD
• I am effective at teaching students the skills needed to resolve environmental issues.	SA	A	U	D	SD
• As a result of attending my class, students are more aware of the impact their individual behaviors have on the environment.	SA	A	U	D	SD

SECTION 4

Affective Education Methods

This section refers to the use of affective education method, which can be used to examine attitudes and values inherent to environmental issues.

Q-39 **Please use the key below to indicate your agreement or disagreement that each of the affective education methods listed are valuable for teaching about the environment. (Circle your answer)**

	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
Sensory or awareness activities				SA	A U D SD
Behavior modification				SA	A U D SD
Moral development activities				SA	A U D SD
Inculcation				SA	A U D SD
Values clarification			SA	A	U D SD
Values analysis				SA	A U D SD

Q-40 **Please check the affective education methods you have actually used to teach about the environment. (Circle number)**

Sensory or awareness activities	1	No	2	Yes
Behavior modification	1	No	2	Yes
Moral development activities	1	No	2	Yes
Inculcation	1	No	2	Yes
Values clarification	1	No	2	Yes
Values analysis	1	No	2	Yes

Q-41 **Please use the key below to indicate your agreement or disagreement with each statement. (Circle your answer)**

	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
• As a result of attending my class, students better understand the roles that values play in environmental issues.				SA	A U D SD
• I believe students are more sensitive toward the environment as a result of attending my class.				SA	A U D SD
• Students have a better understanding about their beliefs, attitudes, and values regarding environmental issues as a result of taking my class.				SA	A U D SD

SECTION 5

Environmental Action Strategies

This section refers to categories of action strategies which individuals or groups can use to help resolve environmental issues. Descriptions of each category are provided.

Persuasion The process of trying to convince others that a certain source of action is correct. Examples include letter writing, debates, posters, etc.

Economic action: The process of using economic pressure to support or oppose a business or industry. Examples include buying environmentally friendly products, boycotting, raising funds for an environmental group, etc.

Political action Any action that brings pressure on political or governmental agencies. Examples include writing letters to representatives, lobbying, voting, participation in public hearing etc.

Eco-management The process of taking physical action toward the environment for the purpose of either maintaining a good environment or improving a weakened environment. Examples include picking up litter, conserving energy, planting trees, etc.

Q-42 Have you involved your students in action strategies, such as those described above, to provide them with opportunities to gain experience in the resolution of environmental issues? (Circle number)

1 No
2 Yes
3 Not sure

Q-43 Please use the key below to indicate your agreement or disagreement with the statement as a reason for NOT involving your students in one or more of the actions. (Circle your answer)

	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
• There is not time for me to assist my students in taking any of these actions.	SA	A	U	D	SD
• It is inappropriate for the students of the grade level I teach to get in these actions.	SA	A	U	D	SD
• I don't have the knowledge to assist my students in taking any of these actions.	SA	A	U	D	SD
• These actions are not related to my subject area.	SA	A	U	D	SD
• My administration does not support student involvement in environmental actions.	SA	A	U	D	SD
• None of the above.	SA	A	U	D	SD

• Other_____

Q-44 Please use the same above key to indicate your agreement or disagreement with each statement. (Circle your answer)

• After attending my class, students are aware of the need to become involved in resolving environmental issues.	SA	A	U	D	SD

- As a result of taking my class, students have gained positive experience in resolving environmental issues. SA A U D SD

- I am effective at teaching students how use action strategies to resolve environmental issues. SA A U D SD

Q-45 I believe my instruction contributes to the development of environmentally literate citizens. (Circle number)

1 No
2 Yes

Thank you for taking the time to complete this survey booklet. Please use the space below and/or additional paper for comment.

Please return the survey booklet in the postage-paid envelope.

THE UNIVERSITY OF TENNESSEE, KNOXVILLE

College of Education
Education in the Sciences, Mathematics, Research and Technology
422 Claxton Addition
Knoxville, Tennessee 37996-3400
(423) 974-5037

November 22nd, 1998
{Name and address of participant}

Dear:

Worldwide efforts are being made to improve the quality of human life and the quality of the environment. In order to achieve these ends, educators like you must prepare individuals to become environmentally literate citizens and well-informed decision-makers in a fast changing technological world. With your participation, this study will provide information about what is being done and what needs to be done to improve environmental education in Tennessee. This study focuses on the status of environmental education in East Tennessee school systems as perceived by elementary and middle school teachers. Your participation, cooperation and honest responses to this questionnaire will be greatly appreciated. The questionnaire will require 30 to 45 minutes of your time to complete.

All data will be kept confidential and stored in a locked cabinet in the researcher's home to which no one other than the researcher will have access. Each questionnaire will be coded with an identification number. Only the researcher will be able to identify individual respondents. No negative effects are expected to result from your participation in this study. Your participation is entirely voluntary and you may refuse to participate, refuse to answer any particular questions, or withdraw at any time without penalty. By answering the questions in the survey you consent to participate in this study.

All data will be summarized for any presentations or publications that arise from the research. If you would like to receive a summary of the findings of the study, or have any questions about this study, please feel free to contact me at **(423) 673-0483 (H)** or **(423) 974-7900 (W)**. You can also reach me at this e-mail address: **asall@utk.edu**.

Please return the survey booklet in the postage-paid return envelope. Thank you for your time and participation.

Peace,
Amadou Sall
Enclosures

THE UNIVERSITY OF TENNESSEE, KNOXVILLE

College of Education
Education in the Sciences, Mathematics, Research and Technology
422 Claxton Addition
Knoxville, Tennessee 37996-3400
(423) 974-5037

December 5th, 1998

{Name and address of participant}

Dear Sir or Madam:

About two weeks ago, I wrote to request your assistance to participate in a research project about Environmental Education in East Tennessee public schools. As of today; I have not received your completed survey. I realize that you are busy but I need your help on this project.

The usefulness of this study depends upon receiving a completed survey from each selected teacher. In the event that your survey has been misplaced, a replacement is enclosed. Please return the survey in the postage-paid envelope.

I would be happy to answer any question you may have about the research. Feel free to contact me at(423) 673-0484 or (423) 974-7900. You can also reach me at this e-mail address: asall@utk.edu.

Thank you in advance for your assistance.

Sincerely,
Amadou B. Sall
Enclosures

Reminder

A few weeks ago, I mailed you a survey seeking your reaction to Environmental Education in East Tennessee Public Schools. If you have completed and returned the survey to me, **please accept my sincere thanks for your prompt response.** If you have not returned the survey, please do so today. I am grateful for your assistance.

If you did not receive a survey, or if it was misplaced, please contact me at the number or e-mail address below, and I will send you another one right away.

Sincerely,

Amadou Sall (423) 974-7900 **asall@utk.edu**

Vita

Amadou Bocar Ciré Sall, was born in a small town, bababé Lao, Mauritania (West Africa). He attended elementary school in Bababé and Nouakchott. Then, he attended le Lycée National de Nouakchott (Nouakchott High School). After school he was trained as a Forest Ranger. He was a District Forestry Chief at Boghé, Mauritania. He taught at L' Ecole National de Formation et de Vulgarization de Kaédi, Mauritania (National School for Agricultural Extension and Training at Kaédi, Mauritania). He also taught Intensive French, Multicultural Science Education and First Year Studies at the University of Tennessee at Knoxville. In December 1990, he received the Bachelor degree of Science in Forest Management at the University of Tennessee at Knoxville. While at the University of Tennessee, Knoxville, he founded the African Student Association, the former Anti-Apartheid Coalition of Tennessee (ACT), and the International Student Council. He served as a member in two Chancellor's committees: International Education and the Campus Cultural Committee. In 1994, he got accepted in the Ph.D. program in Education at the University of Tennessee, Knoxville. He graduated in December 1999. He is currently a staff member of the TRIO program, the Educational Advancement Program at UTK.