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The TVA network of centers for environmental education: An examination of factors that contribute to success

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The Ohio State University, 1993
THE TVA NETWORK OF CENTERS FOR ENVIRONMENTAL EDUCATION:
AN EXAMINATION OF FACTORS THAT CONTRIBUTE TO SUCCESS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Terry Lyn Wilson, B.S., M.S.

** * * * *

The Ohio State University

1993

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CHAPTER I
INTRODUCTION

This study examined critical factors related to the development of a network of university-based centers for environmental education. This included an examination of factors relating to the development of individual centers, the networking process that operates among the centers, and the perceptions of certain center stakeholders on the importance of environmental education goals to their center.

In the introductory chapter, a rationale for the study is provided, along with the statement of the problem examined and its associated research questions. It concludes with a set of definitions that are intended to clarify terminology, along with statements relating to the assumptions and delimitations of the study.

Rationale

During the past twenty-five years the quality of the environment has been publicly recognized as a major determinant of the quality of life in the future. The necessity for the creation of an environmentally literate citizenry has been stated consistently during this time by a wide variety of individuals, organizations and government
entities. In his August, 1970 Environmental Message to Congress, President Nixon stated that "it is vital that our entire society develop a new understanding and a new awareness of man's relation to his environment." He called for the development and teaching of environmental concepts at every point in the educational process in order to create what he called "environmental literacy" in the United States (Nixon, 1970). On November 20, 1990, President Bush signed the National Environmental Education Act of 1990 into law. The act gave the United States Environmental Protection Agency (EPA) the primary responsibility for administering the new legislation. In outlining EPA's educational goals, Administrator William Reilly again identified the need to increase environmental literacy throughout the country and to promote careers related directly to environmental improvement (Reilly, 1991).

The term "environmental education" means many things to many people, including those who refer to themselves as "environmental educators." The multiplicity of meanings is, at least in part, an outgrowth of the relative newness of the term, the nature of its origins, and the variance in the goals of its professionals. Defining environmental education, particularly for the benefit of those who reside in one of the more established niches of the academic world, is considered by many to be a continuing dilemma (Disinger, 1983).
The recognition that environmental education has evolved from roots in nature study, conservation education, and outdoor education has been addressed in the literature ever since the term environmental education began being used in the late 1960s (McInnis, 1972; Swan, 1975; Johnson, 1977; Hungerford, Wilke, & Peyton, 1983). The literature does show that although a universally accepted definition does not exist, environmental education does have substantive structure and framework (Hungerford, et al. 1983). Most environmental educators agree that 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 those problems, and motivated to work toward their solutions (Stapp, 1969).

During the same two decades, a variety of approaches to the implementation of environmental education programs has been developed. Of interest to many are the leadership efforts of a somewhat unique federal agency, the Tennessee Valley Authority (TVA). Created in 1933, TVA has a regional focus, serving parts of seven states that approximate the drainage basin of the Tennessee River. In creating TVA, Congress charged it with the responsibility to assist in the proper use, conservation, and development of the natural resources of the Tennessee Valley. Unlike many other federal agencies involved in managing natural resources, TVA is a multiple resource agency which utilizes an integrated resource
management approach (Hodges, 1993). TVA is involved directly with management of the river system and its accompanying lands, natural resource management, economic development, and electrical power production.

With the creation of the 170,000 acre national recreation area known as Land Between the Lakes in the early 1960's, TVA was charged with the development of an environmental education program that would serve as a national demonstration in environmental education. The educational effort commenced with the establishment of a 5,000-acre conservation education center. The residential facility known as the Youth Station provided the base of operations. The center catered mainly to school groups and resembled other residential outdoor education programs in existence at that time (Smith, 1971).

Beginning in 1975, the Tennessee Valley Authority became the major force behind the creation of a network of university-based centers for environmental education. As of March, 1993, 14 universities in the Tennessee Valley region have created environmental education programs that were initiated through contractual arrangements with TVA. These contracts have provided the universities with "seed" money which has been used to help each establish a center for environmental education. The intention was that eventually these centers would become regular "hard-money" entities of each university (Wilson & Kirkland, 1987).
The mission of the network is to "strengthen and promote the regional development and delivery of exemplary environmental education" (Judy, 1993, p.18). The centers are to be places to which citizens of the Valley can turn for information and guidance about a broad range of environmental concerns. Providing leadership and expertise, they provide a regional clearinghouse for individuals and organizations interested in educating others about the environment (Judy, 1993).

Each university participating in the network was asked by TVA to provide four functions to its constituents: (a) teacher training, (b) program development, (c) regional outreach services, and (d) research. These functions were originally operationalized at Murray State University (Murray, Kentucky). Murray State was the first university to establish a center and has served as the model for the continuing development of the network (Wilson & Judy, 1987). The four functions evolved from the traditional university roles of instruction, service, and research. The specific attention to program development came from Kentucky's state plan for environmental education which addressed the roles of institutions of higher education in environmental education (Kentucky Department of Education, 1975).

Although all 14 of the existing university-based centers in the network embrace the center concept and are creating programs that honor the four functions described above, TVA
has not attempted to dictate what the centers should emphasize and what the goals of the centers should be. TVA has generally taken the position that it is assisting in the development of a network of centers, and that, as a federal agency mainly concerned with natural resource management and economic development, it should not be in the business of dictating educational policy to educational institutions (Wilson & Kirkland, 1987). Therefore, the process of actually developing a center has been left to each host institution. Further, the issue of the goals of the centers and their relationship to the established goals for environmental education has been left up to the individuals directly involved in directing each center.

The Problem

The TVA network has been functioning and growing for seventeen years. However, no one has conducted an in-depth study of the characteristics of the centers in the network. Therefore, this study examined critical factors involved in the successful development of the centers and the network. It also examined the perceptions of certain center stakeholders on the importance of environmental education goals to their centers. Moreover, because the network has evolved with new centers being established over the last seventeen years, comparisons were made between mature and young centers. The following research questions guided the effort:
1. What factors influenced the development of university-based centers for environmental education in the TVA network?

2. How did center directors differ in their ratings of the importance of the goals for environmental education to the field of environmental education, to their center, to the inservice teacher education function of their center, and to the extent goals are already being addressed by the inservice teacher education function of their center?

3. How did teachers served by mature centers and teachers served by young centers differ in their ratings of the importance of the goals for environmental education to the field of environmental education, to their center, to the inservice teacher education function of their center, and to the extent goals are already being addressed by the inservice teacher education function of their center?

4. How did elementary and secondary teachers served by the centers differ in their ratings of the importance of the goals for environmental education to the field of environmental education, to their center, to the inservice teacher education function of their center, and to the extent goals are already being addressed by the inservice teacher education function of their center?

Definitions

As with any investigation into a field as diverse as environmental education, some definitions are needed for the
purpose of clarity and focus. The following definitions are used throughout this dissertation. They represent a combination of statements which come from the literature or have evolved in the course of this investigation.

**Environmental education:** Environmental education is a process of developing a citizenry that is: (a) knowledgeable of the interrelated biophysical and sociocultural environments of which humans are a part; (b) aware of the associated environmental problems and management alternatives of use in solving these problems; and (c) motivated to work toward the maintenance and further development of diverse environments that are optimum for living (Roth, 1969).

**Centers for Environmental Education:** Centers for environmental education are organizational entities that are engaged in environmental programs in the areas of teacher education, program development, community outreach, and research. For this study, the centers are based at state-supported universities and were organized through cooperative agreements with the Tennessee Valley Authority (TVA). TVA initiated the Murray State center and four other university-based centers between 1976 and 1982. In 1982 TVA recognized that those five centers were continuing to operate even though the initial funding from TVA had ended. In this study, these five centers are called **mature centers**, representing TVA's initial efforts to assist institutions of higher education with the establishment of centers. A decision was then made
by TVA to help establish another group of centers. Nine additional university-based centers, organized after 1982, were then initiated. For this study, these centers are termed young centers.

**Stakeholder:** For this study, a stakeholder is an individual or a group that has a vested interest in a center for environmental education. Examples of stakeholders in this study are center directors, teachers served by the centers, and TVA.

**Network:** A network is a system of free-standing organizations or individuals that are connected through shared interests (Lipnack & Stamps, 1986).

**Elementary education teachers:** Elementary education teachers are those teaching in traditional kindergarten through grade six.

**Secondary education teachers:** Secondary education teachers are those teaching in traditional grades seven through twelve.

**Goal categories:** Although the word goal appears frequently throughout this document, the term "goal categories" refers to sets of goal statements falling into Awareness, Knowledge, Values, Skills, and Participation categories. The categories were defined by Stapp (1978) as follows:

**Awareness:** This goal category focuses on helping social groups and individuals acquire an awareness of and sensitivity to the total environment and its problems.

**Knowledge:** This goal category focuses on helping social
groups and individuals gain a variety of experiences in and acquire a basic understanding of the environment and its problems.

**Values:** This goal category focuses on helping social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental protection and improvement.

**Skills:** This goal category focuses on helping social groups and individuals acquire the skills for identifying and solving environmental problems.

**Participation:** This goal category focuses on providing social groups and individuals with opportunities to become actively involved at all levels in working toward the resolution of environmental problems.

**Assumptions**

The following assumptions underlie the study:

1. The interview processes that were designed for this study were reliable and valid ways to answer the questions posed during the interviews.
2. The center directors who were interviewed answered the interview questions in an honest and conscientious manner.
3. The demographic information forms and the goals survey instrument were reliable and valid means for making the measurements for which they were designed and used.
4. Center directors and teachers who completed the instruments used in this study did so conscientiously.

5. The goal statements used in the goals survey instrument are representative of the field of environmental education and are important in the development of an environmental education program.

**Delimitations**

The delimitations of the study were:

1. The center directors participating in this study were limited to those who direct state-supported university-based centers for environmental education initiated by the Tennessee Valley Authority.

2. The teachers participating in this study were limited to teachers who appear on the mailing lists of the university-based centers for environmental education in the network of centers created by the Tennessee Valley Authority.

3. The teachers participating in the study responded to the goals survey on a voluntary basis.

4. Instrumentation focused on the perceptions of center directors and teachers served by the centers on the importance of goals for environmental education to the field of environmental education, to their center, to the inservice teacher education function of their center, and to the extent that the inservice function is addressing the goals.
CHAPTER II
REVIEW OF RELATED LITERATURE

The nature of the research questions posed in Chapter I deal with factors influencing the development of university-based centers in the TVA network and perceptions of various center stakeholders regarding goals for environmental education. Thus, the survey of literature related to this study was considered in two major areas:

(a) Networking in environmental education, and
(b) Goals for environmental education.

Networking in Environmental Education

Lipnack and Stamps (1986) have described a network as a web of free-standing, independent individuals or groups joined by shared values and/or interests. Therefore, the process of networking becomes the process of connecting people with other people in ways that link both ideas and resources. At the simplest level, a network could result from having one individual who has a need for connecting with another person who has a resource. From that basic idea, the concept of networking is being increasingly embraced by individuals who question traditional, hierarchical approaches to organizations. They see the network as an organizational
pattern that is more horizontal, providing participants with more opportunities for involvement (Lipnack & Stamps, 1986). This notion of a system of interactive partners may provide a more accurate description of networking than some of the other connotations of the term network. A television network, for example, may suggest something about connecting people, but it falls short of providing a valid metaphor for a system in which all players are equal partners, with each being both receivers and providers of information, ideas, and resources.

Considered by some to be the seminal theoretical work about extensive people-to-people networks, the research by Gerlach and Hines (1970) looked into the structure of two large networks, the Black Power Movement and the Pentecostal Movement. Although the ideological perspectives of these two groups are substantially different, Gerlach and Hines found that the structures of these massive movements were quite similar. Further, the basic characteristics of both organizations were the same. First, both were decentralized organizations, connected by horizontal linkages. Unlike most bureaucracies, which could be said to be analogous to a chair which when one of its legs is cut off cannot stand, the component parts of the organizations were found to be self-sufficient. Second, the two groups were characterized as segmentary, in that each decentralized part, though in itself autonomous, still contributed to a complete "whole." Lastly, Gerlach and Hines (1970) called the two groups reticulate,
with the connections between their components growing and changing continually as the overall organization changed.

Hines (1977), in studying changing paradigms of sociocultural systems, identified an additional quality of networks. She concluded that shared values may be the most important characteristic of a network, claiming that they hold the decentralized segments of a network together in a dynamic pattern of interactions. Lipnack and Stamps (1986) studied the interactions of the Transnational Network of Appropriate/Alternative Technology (TRANET). They found that although TRANET had a home (in Rangeley, Maine), a staff, and a vast memory bank of expert information in the area of appropriate technology, the main purpose of TRANET was not control but facilitation. It emphasized the free exchange of information as much as the information itself. This seemed to provide an environment that nurtures cooperative decision making by any and all members in the network.

Lipnack and Stamps (1986) also studied electronic and computer networks as models for sharing and accessing vast amounts of information. Unlike its predecessor known as computer-assisted instruction (CAI) which was designed to have people interacting directly with a computer, computer-mediated communication systems link people with people. Computer-mediated communication systems can range from local to global in scope. As with the international network known as EcoNet, it can allow people to think and act both locally and globally
(Shuman, Copeland, Graham, Miller, & Zaunbrecher, 1987). The environmental movement has long taken advantage of the process of networking. Coordinated efforts by such organizations as the Sierra Club, Friends of the Earth, and Greenpeace have provided examples of the networking process since their inception (Lipnack & Stamps, 1986).

Somewhat more recently, environmental education programs have been urged to network in an effort to make the most of their efforts. Wals (1990) reported on a group of students and teachers from 45 countries that organized as part of the Caretakers of the Environment International. He noted that in the early years, the project was largely dependent on outside funding. However, as its organizational structure decentralized to include a broader, more diverse set of stakeholders, a more stable and continuous network evolved. And while the organization focused on large conferences of teachers and students in the beginning, it now sponsors smaller regional meetings, a newsletter, and a year-round computer conference. At the National Leadership Conference on Environmental Education held in Washington, D.C. in March 1978, Stapp provided a set of recommendations intended to help frame a national strategy for environmental education. The recommendations represented a composite of agreements reached at several national and international environmental education conferences, most notably the Intergovernmental Conference on Environmental Education, held in Tbilisi, Georgia, USSR, in
October, 1977. At Tbilisi, representatives of sixty-six member nations of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) met to discuss the role that education should play in addressing global environmental problems. The conference encouraged both national and international cooperation in the development of environmental education programs (UNESCO, 1978).

Among the major strategy recommendations was the call for both national and regional organizations to establish a network that could coordinate the exchange of information and materials (Stapp, 1978). This exchange could be supported by communication mechanisms that would reach beyond the United States to form the basis of an international network designed to promote exchanges of research findings and teaching materials.

An additional focus of the 1978 national leadership conference was the role that the federal government should play in implementing the national strategy. This role was accented by the call for a national center for environmental education, which was first suggested at the Tbilisi conference in 1977 by Dr. Mary Berry of the U.S. Department of Education. However, as Gustafson (1983) noted, the reliance on federal governmental support and leadership called for in 1978 proved to be shortsighted and unrealistic, particularly after the change of administrations in 1980 defused much of the optimism generated in the late 1970's. In contrast, participants at a
subsequent national conference held in 1983 in Burlington, Vermont, attempted to identify efforts which would tend to be more decentralized. Six working groups met for two days at this conference. The groups focused on the roles of youth-oriented organizations, non-governmental groups, citizen groups, elementary and secondary education, higher education, government, and industry/business and labor in environmental education. Each group mentioned the need for the creation of a national network of environmental education centers and recommended that a national center, if created, should be coordinated not by government but by a group that is non-governmental in structure. In addition, specific strategies were generated that encouraged the development of networking processes through regional mechanisms that would result in the strengthening of the national effort without a total dependence on the federal government (Gustafson, 1983).

An effort to create environmental education centers had already been initiated by one federal agency in the 1970's. The Tennessee Valley Authority (TVA), a federal agency which has a unique regional focus, serves an area of the southeastern United States that is roughly equivalent to the drainage basin of the Tennessee River. Because TVA is the major producer of electricity in that region, the direct effects of the agency are felt in parts of seven states, encompassing the watershed and additional areas served by TVA power (Hodges, 1993). The production of electrical power is
part of a broader resource management role that is dictated by the original TVA charter. In its efforts to achieve a balance between economic development and natural resource management, TVA has made education about the land and its resources a focal point.

In 1976, TVA helped to mobilize a cooperative relationship among itself, Murray State University, and eleven school systems in the western portion of Kentucky. The primary purpose of the program at that time was the inservice training of teachers from the cooperating schools, a group which came to be known as the West Kentucky Environmental Education Consortium (Blankenship & Wilson, 1985). The success of this relationship prompted Murray State University to create the Center for Environmental Education, a university-based program which encompassed the school consortium as the inservice function of the center. As the program became more institutionalized, the inservice function broadened to include the instruction of preservice teachers in environmental education content and methodologies (Blankenship & Hodges, 1977).

When the initial seed money provided by a TVA contract stopped flowing in 1980, the Center had become a regular "hard-line" entity of the university and had broadened in scope. The center then encompassed four functional areas. These were teacher training, program development, regional service, and research (Wilson & Judy, 1987).
The success of the program at Murray State University prompted TVA to design a strategy for establishing other such cooperative ventures. Four additional centers were established by 1982 at Memphis State University, Middle Tennessee State University, the University of Tennessee at Chattanooga, and Western Carolina University (North Carolina). At Memphis State, Middle Tennessee State, and the University of Tennessee at Chattanooga, the directors were faculty in each college of education's teacher education department. At Western Carolina University the director was a faculty member in the college of arts and sciences who was also involved in teacher education (Judy, 1993).

By 1985, centers had been established at Jackson State University (Mississippi), Tennessee Technological University, Tennessee Wesleyan College, the University of Alabama in Huntsville, and Western Kentucky University (Ambry, 1985). More recently, centers for environmental education have been created at North Georgia State College, the University of North Alabama, the University of Tennessee at Knoxville, and the University of Tennessee at Martin. In all but one of these institutions, the program began in a teacher education department. The University of Alabama in Huntsville originally incorporated its program into the Johnson Energy Center, a research facility.

In addition, two TVA-initiated non-university-based centers operate out of Cedar Creek Learning Center
(Greenville, Tennessee) and Bear Creek Watershed Environmental Education Center (Hodges, Alabama). These centers grew out of the need to provide residential outdoor education experiences for school children in these regions. Although these two programs have broadened since they were started, they still provide residential outdoor education experiences as a major emphasis (Judy, 1993).

In a study regarding TVA's environmental education program, Ambry (1985) found that the network of centers was developing in a way in which the whole was becoming more than just the sum of its parts. As a result of interviewing directors of centers and reading progress reports, he concluded that each university had its own inner networks that could be accessed in ways never envisioned when the process of creating a network began. It was found that each center was developing a constituency of school districts which expressed favorable views toward their center. He also found that although the network existed in largely rural parts of the U.S., the programs offered through the network had a higher percentage of minority involvement than the national average. Among the major recommendations of the study was a call for TVA to help initiate a national network of environmental education centers. It was noted that, as a federal agency TVA could provide technical assistance to other regions of the country as interest in such a network might exist.
In defining the functions of the TVA centers more specifically, Judy (1993) describes teacher training in curriculum and instruction as being provided through workshops, inservice programs, and preservice training that tends to integrate environmental education into existing courses. This infusion approach is typical at the elementary and secondary level, according to Charles (1987). In theory, this promotes environmental education as an interdisciplinary entity which is evident at every grade level and in all aspects of the school curriculum. The emphasis on using person-to-person workshops as a delivery mechanism has also been supported by Mayer and Fortner (1987), who found that short, intensive workshops were a cost-effective way of insuring that the materials introduced in the workshop were indeed used by the teachers who participated.

Judy (1993) discussed the program development function as being accomplished in cooperation with teachers as they developed and distributed curriculum materials, supplementary guides, audiovisual presentations, computer software, and other tangible products. In some institutions, it may also encompass the development of degree programs relating to environmental education. Regional service is provided to citizens in the service area through technical assistance, presentations, and material resources. Finally, Judy (1993) discussed research as a function of the center, which tended to be oriented to the field testing of new educational
products, evaluation of program impacts, and surveys of students and teachers.

In 1986, the Alliance for Environmental Education, originally formed as an umbrella organization of non-profit organizations, initiated the formation of a national network of centers for environmental education based upon the TVA model. Pemberton (1988) reported on the progress of the Alliance for Environmental Education in incorporating centers into its National Network for Environmental Education (NNEE). Presently, more than 100 centers have formally joined the network. Although they are based in a variety of organizational settings (including universities and colleges), all indicate a willingness to be involved in the four functional areas of teacher training, program development, regional service, and research, that were originally envisioned by TVA.

Two additional studies have been conducted on the TVA network of centers for environmental education. Wilson and Kirkland (1987) conducted a survey of the directors of the twelve centers in the TVA network at that time. Directors were asked on which of the four functional areas they tended to place their emphasis. In ten of twelve cases, the directors said that teacher training (particularly inservice teacher training) was the area that they focused on first and foremost. The findings of this survey resulted in a set of recommendations for the development of new centers. They
included suggestions relating to funding, needs assessments, identification of institutional strengths, the creation of advisory boards, and the maintenance of reliable methods of communication with the center's stakeholders.

Gardner and Meadows (1992) conducted a needs assessment and survey dealing with the current programs of the TVA network of centers. More than 300 educators completed instruments which were intended to determine the impact of the network and the needs of educators throughout the Tennessee Valley in the area of environmental education. Respondents noted changes relating to the incorporation of environmental education in the classroom in the areas of curriculum, teaching methods, available materials, physical environment, and ways in which teachers related to their students. More than 90% of the respondents agreed that activities offered by their center had broadened their "vision of what environmental education ought to be" (Gardner & Meadows, 1992, p.6).

Goals for Environmental Education

Though much has been accomplished in the attempt to educate people about the environment, it is important that, at some point in the pursuit of that endeavor, the question of what ultimately an environmental education program is trying to achieve must be addressed. A few doctoral-level research studies have been conducted in order to more clearly define environmental education in terms of goals, perspectives, and structure. As a precursor to actually addressing goals,
Yambert (1961) looked at concepts that could guide those involved in teaching conservation. He concluded that there are three major groups of concepts that should be included in a conservation education program. These dealt with the ecosphere and its parts, the nature of various resources, and conservation measures that could be used to manage the resources. Roth (1970) developed a list of concepts that could be used as a taxonomy as instructional programs are developed for what he called "environmental management education".

Harvey (1976) identified the expected outcome of environmental education as "environmental literacy." He delineated this goal at three levels: (a) environmentally literate; (b) environmentally competent; and (c) environmentally dedicated. These levels were identified by examining the literature and looking for key phrases and terms that were consistent in existing definitions. His superordinate goal called for the development of a citizenry that would become environmentally knowledgeable and, above all else, skilled and dedicated, willing to work individually and collectively toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment. Harvey's work extended the conclusions that Stapp (1969) had reached in emphasizing that an environmentally educated person should be knowledgeable about his or her natural and cultural environments, aware of
problems threatening those environments, and motivated to act in attempting to solve those problems.

In looking at the intended outcomes of environmental education programs and projects around the United States, Childress (1978) found that although efforts underway at that time tended to focus on students becoming more knowledgeable about the environment and its problems, as well as more aesthetically appreciative of the resources that the environment provides, little emphasis was being placed on preparing students to actually solve environmental problems. Using Harvey's work as a springboard, Hungerford, Wilke and Peyton (1980) set out to develop a framework for curriculum development which took the "mediating definition" and created goals for curriculum development in environmental education. The developers of these goals initially assessed their content validity by comparing them to the goals developed at the Intergovernmental Conference on Environmental Education held in Tbilisi, Georgia (in the former USSR) in 1977. What are now referred to as the Tbilisi objectives are organized into the five areas of awareness, knowledge, attitudes, skills, and participation (UNESCO, 1980).

During the 1980s, the awareness to participation spectrum initially framed by the participants of the Tbilisi conference has provided an organizing paradigm for a variety of environmental education projects and programs. The comparison between the Tbilisi objectives and the goals developed by
Hungerford, Peyton, and Wilke (1980) were presented to a panel of nationally recognized environmental educators for their evaluation. With the comments of the panel, the developers made their final revisions to what were reported as the Goals for Curriculum Development for Environmental Education. These curriculum goals were organized under four categories or levels.

Level I relates to ecological foundations, and deals specifically with the goal of having students gain sufficient knowledge of key concepts in ecology and associated ecological principles so that they would be capable of making decisions that are ecologically sound. Level II goals relate to the awareness of issues and human values. These goals focus on the knowledge of how human activities influence both environmental quality and the overall quality of life. Level III relate to goals that deal with the investigation and evaluation of issues and solutions, and address the development of skills needed to actually carry out the investigation of a given issue and then assess the merits of various solutions. Finally, Level IV goals deal specifically with citizenship action, and target the teaching of skills needed for students to take appropriate environmental action (Hungerford, Peyton, & Wilke, 1980). In a national survey of curriculum needs as perceived by professional environmental educators, Volk, Hungerford, and Tomera (1984) found that although there was widespread agreement in the field that the
environmental education curriculum goals developed by Hungerford, Peyton, and Wilke (1980), as well as the broader Tbilisi conference goals, were indeed important, on a national scale they were not being accomplished. The survey indicated the need for the development of new curricula which are designed around environmental education goals. Further, the survey revealed the need for research to identify why teachers do not emphasize the upper level goals relating to issue investigation and environmental action skills. They also called for the development of new approaches for formulating teacher training programs in environmental education (Volk, et al, 1984).

Similar findings were reported by Pomerantz (1991) in a study of the usage of natural resource education materials in New York State. In screening 994 individual lessons taken from a variety of printed materials, she determined which of the New York Department of Environmental Conservation's list of natural resource goals for elementary students were being addressed. She concluded that the materials being used with elementary students in New York primarily dealt with goals that were at the basic environmental awareness and knowledge levels. Lessons that were knowledge-based tended to deal with basic ecological principles. However, few lessons specifically addressed goals related to analyzing natural resource issues and exhibiting responsible environmental behavior.
Two studies dealt with questions relating to why teachers teach or fail to teach about environmental issues. In comparing teachers' attitudes, Jaus (1978) found that teachers receiving no training in environmental education, although they viewed environmental education as important, lacked a personal commitment toward teaching about environmental issues themselves. Peyton (1977) surveyed 225 preservice and inservice teachers for the purpose of assessing their perception of not only their abilities to teach units about taking action on environmental issues, but also their own personal commitment to carrying out environmental action in the future. In general, the findings indicate that most of the population sampled perceived that they had little competence in teaching environmental action strategies and had incomplete or no plans to carry out environmental action in their own lives. The research indicated that limited ability and willingness of teachers to be involved in environmental education and action greatly restricts the achievement of environmental literacy.

In summary, it does appear from the literature that networks of various types have been evaluated and some general qualities of networks have been identified. However, no substantive research has attempted to examine the characteristics of university-based environmental education centers and how they function as a network. In an effort to characterize such a network several factors should be
considered. These factors range from basic organizational patterns to the relationship of goals for environmental education to the network. This document describes research into some of the factors influencing the development of university-based centers for environmental education operating in the TVA network and the perceptions of directors and teachers on the importance of environmental education goals to the centers.
CHAPTER III
METHODOLOGY

This chapter describes how the study was conducted. It includes a brief description of the TVA network, followed by a delineation of the population and sample studied. Next, the various data sources that were utilized are described. The specific data collection procedures are then outlined, followed by a discussion of the procedures used in the data analysis.

Population and Sample

The author has had continual opportunity to work with a network of centers for environmental education which are located within the service area of the Tennessee Valley Authority (Appendix A). Fourteen of the centers are based at institutions of higher education and two are hosted by residential environmental education programs that serve local schools. This study involved three different sets of stakeholders associated with the centers and yielded data through interviews of directors and the administration of a goals survey.

Initial Interviews

One group studied was comprised of the directors of the
centers. In an effort to better understand some of the factors affecting the development of the centers, interviews were conducted with a sample of seven of the center directors during May, 1991. The directors interviewed were chosen because the centers which they direct span the geographical region of the Tennessee Valley. This includes parts of seven southeastern states, from its eastern boundary in the mountains of North Carolina, west to the Mississippi River, and from western Kentucky in the northern edge of the watershed, south to the northern third of Mississippi, Alabama, and Georgia (Appendix A).

The centers they represent are located at Murray State University (Kentucky), the University of North Alabama, the University of Alabama in Huntsville, North Georgia College, the University of Tennessee at Knoxville, Memphis State University (Tennessee), and Western Carolina University (North Carolina). The host institutions of these centers also vary in size and scope. The state-supported universities at Murray State, North Alabama, North Georgia, and Western Carolina have enrollments of from 7,000 to 12,000 students and serve as a resource for a specific region of their respective states. In contrast, the very technically-oriented University of Alabama in Huntsville, with an enrollment of approximately 8,000 students, operates largely as a research facility. Memphis State University and the University of Tennessee at Knoxville are the largest institutions in the network (with
student populations above 25,000) and are located in larger urban settings.

The group of directors interviewed represented 50% of the total number of directors of university-based centers in the network. The distribution of the centers directed by this sample spanned the geographical region of the Tennessee Valley. Further, the size of universities represented in the sample ranged from the smallest state-supported institution (Murray State University) to the largest institution (University of Tennessee at Knoxville).

**Follow-up Interviews**

Approximately two years later, additional telephone interviews were conducted with the directors of the centers at Murray State University, the University of Tennessee at Knoxville, and the University of Alabama in Huntsville. The three directors represented 33.3% of the original directors interviewed and 23% of the population of directors of all university-based centers in the network (excluding the center directed by the author). These interviews were designed to enhance the data collected in 1991 and to gather information that was used to generate short case histories of the three centers involved.

In deciding which three university-based center directors to include in follow-up interviews, the author and his doctoral committee considered several factors. The centers were chosen because they exist in very different geographical
settings and vary in size. The host institutions of these centers also have histories that vary as well. Murray State University evolved from a teachers' college to a regional university where service to the region is emphasized. The University of Tennessee at Knoxville began as the land grant university of the state of Tennessee and has become its leading research institution. The University of Alabama in Huntsville is well known for its ties to technological development, particularly as it relates to aerospace research and development.

All interview data described above were used to develop a response to research question one, which related to factors which influence the development of the centers in this network. The structure of the interviews and the questions asked are described in the next section of this chapter.

Goals Survey

Responses to research questions two through four of this study were formulated using a survey instrument. This portion of the study focused on the perceptions of center directors and teachers served by the centers in the network regarding established goals for environmental education. These perceptions were analyzed in order to provide additional insight into how different center stakeholders view the relationship between environmental education goals and the activities of their center.

In this part of the study, thirteen of the directors
participated. Five of the directors came from centers which are mature centers and eight came from centers which are young centers. As defined in Chapter I, the mature centers were the first group of centers in the network and were initiated prior to 1982. The young centers were created after 1982. Included were all thirteen of the directors of centers which are hosted by institutions of higher education, with the exception of the center at Western Kentucky University. This center was not included in the study because it is the center directed by the author.

Samples of teachers surveyed were randomly selected from the regions served by state-supported institutions of higher education with centers in the TVA network. This excluded from the sample teachers served by Tennessee Wesleyan College, a private four-year college, as well as those served by Cedar Creek Learning Center and Bear Creek Watershed Environmental Education Center, both of which are based at residential environmental education facilities and are not directly attached to a college or a university.

Mailing lists were made available from nine of the centers, this included the mature centers at Western Carolina University, Murray State University, Memphis State University, and The University of Tennessee at Chattanooga, and the young centers at North Georgia College, The University of Tennessee at Knoxville, The University of Tennessee at Martin, The University of North Alabama, and The University of Alabama in
Huntsville. A random sample of ten elementary teachers and ten secondary teachers were drawn from each center mailing list except for Memphis State University. (Memphis State University's center only had elementary teachers on its mailing list.) The 170 individuals sampled represented 12.6% of the total number of teachers on the thirteen mailing lists. Gay (1981) considers a 10% sample size to be adequate when conducting descriptive studies. The teachers making up the sample were selected using a table of random numbers provided by Gay (1981).

Demographic information was collected from each of the teachers who responded to the survey. These data provide a more detailed description of the overall sample and a sense of the types of teachers who are served by the university-based centers in the TVA network. Table 1 summarizes basic characteristics of the teachers who responded to the goals survey. Of the 102 teachers who returned the survey (60% of the sample), 88 were female and 13 were male. The average respondent was 41.2 years old and had taught for 13.9 years. Seventy-seven percent of the teachers had graduate degrees and 34.3% were working on advanced degrees. The data from the same teachers are further broken down according to the maturity of their center. Of the 102 teachers who responded, 44 were from mature centers and 58 were from young centers.

Table 2 summarizes the characteristics of the classrooms and schools of teachers who responded to the survey. The
Table 1
Characteristics of Teachers (n=102) Responding to the Environmental Education Goals Survey by Maturity of Center

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall</th>
<th>Percent of Total</th>
<th>Mature Centers</th>
<th>Young Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>102</td>
<td></td>
<td>44</td>
<td>58</td>
</tr>
<tr>
<td>Males</td>
<td>14</td>
<td>13.7%</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Females</td>
<td>88</td>
<td>86.3%</td>
<td>35</td>
<td>53</td>
</tr>
<tr>
<td>Age (Mean)</td>
<td>41.2</td>
<td></td>
<td>39.1</td>
<td>42.8</td>
</tr>
<tr>
<td>Years Teaching (Mean)</td>
<td>13.9</td>
<td></td>
<td>12.5</td>
<td>18.1</td>
</tr>
<tr>
<td>Highest Education Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelors</td>
<td>23</td>
<td>22.5%</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Masters</td>
<td>68</td>
<td>66.7%</td>
<td>27</td>
<td>41</td>
</tr>
<tr>
<td>Specialist</td>
<td>11</td>
<td>10.8%</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Doctoral</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number Working on Advanced Degrees</td>
<td>35</td>
<td>34.3%</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Degree Working On</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masters</td>
<td>19</td>
<td></td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Specialists</td>
<td>12</td>
<td></td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Doctoral</td>
<td>4</td>
<td></td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 2  
Characteristics of Classrooms and Schools of Teachers  
(n=102) Responding to the Environmental Education Goals  
Survey by Maturity of Center

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall</th>
<th>Percent of Total</th>
<th>Mature Centers</th>
<th>Young Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of School</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>28</td>
<td>27.5%</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Suburban</td>
<td>23</td>
<td>22.5%</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Rural</td>
<td>51</td>
<td>50.0%</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Size of School</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 200 students</td>
<td>9</td>
<td>8.8%</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Between 200 &amp; 500 students</td>
<td>32</td>
<td>31.4%</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Over 500 students</td>
<td>61</td>
<td>59.8%</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Grade Levels Taught</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindergarten</td>
<td>8</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Grade 1</td>
<td>9</td>
<td></td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Grade 2</td>
<td>10</td>
<td></td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Grade 3</td>
<td>10</td>
<td></td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Grade 4</td>
<td>5</td>
<td></td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Grade 5</td>
<td>14</td>
<td></td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Grade 6</td>
<td>21</td>
<td></td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Grade 7</td>
<td>19</td>
<td></td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Grade 8</td>
<td>19</td>
<td></td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Grade 9</td>
<td>28</td>
<td></td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Grade 10</td>
<td>38</td>
<td></td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Grade 11</td>
<td>40</td>
<td></td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Grade 12</td>
<td>37</td>
<td></td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>Subject Areas Taught</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>91</td>
<td></td>
<td>50</td>
<td>41</td>
</tr>
<tr>
<td>Social Studies</td>
<td>36</td>
<td></td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>Math</td>
<td>41</td>
<td></td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>Language Arts</td>
<td>44</td>
<td></td>
<td>28</td>
<td>16</td>
</tr>
<tr>
<td>Other</td>
<td>43</td>
<td></td>
<td>29</td>
<td>14</td>
</tr>
</tbody>
</table>
The sample shows that over half of the teachers served by the centers worked in schools that were located in rural areas and had student populations of over 500. A large majority of the teachers served by the centers (91 of 102) taught science all or part of the time. Over one-third of the teachers taught social studies, mathematics, and language arts.

The environmental education experiences of teachers who responded to the survey are summarized in Table 3. The average teacher had taught environmental education for 7.4 years. Teachers served by mature centers had taught environmental education for almost two years more than teachers served by young centers.

Most of the teachers had some sort of training experience in environmental education. Over half of the teachers had attended summer institutes (51.9%), weekend workshops (56.8%), and school day inservice programs (60.6%) in environmental education, and nearly half of the teachers (44%) had taken formal college courses in environmental education.

Approximately one-fourth of the teachers (23.5%) had conducted an inservice program in environmental education. The average number of inservice programs conducted was 9.5. Over half of the teachers (54.9%) had used some type of outdoor classroom.
### Table 3
Environmental Education Experiences of Teachers (n=102)
Responding to the Environmental Education Goals Survey by Maturity of Center

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent of Total</th>
<th>Mature Centers</th>
<th>Young Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years Taught EE (Mean)</strong></td>
<td>7.4</td>
<td>8.5</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Summer Institutes Attended</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>50 49.0%</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>39 38.2%</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>6 5.9%</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3 or more</td>
<td>7 6.9%</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Weekend Workshops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>44 43.1%</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>1</td>
<td>42 42.2%</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>3 2.9%</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3 or more</td>
<td>13 12.8%</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td><strong>School Day Inservice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero</td>
<td>40 39.2%</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>1</td>
<td>48 47.1%</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>6 5.9%</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3 or more</td>
<td>8 7.8%</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td><strong>Formal Courses</strong></td>
<td></td>
<td></td>
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<tr>
<td>Zero</td>
<td>53 51.9%</td>
<td>18</td>
<td>35</td>
</tr>
<tr>
<td>1</td>
<td>37 36.3%</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>5 4.9%</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3 or more</td>
<td>7 6.9%</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Number of Teachers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducting EE Inservices</td>
<td>24 23.5%</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td><strong>Number of EE Inservices</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducted (Mean)</td>
<td>9.5</td>
<td>5.4</td>
<td>11.4</td>
</tr>
<tr>
<td><strong>Number Using Outdoor Labs</strong></td>
<td>56 54.9%</td>
<td>22</td>
<td>34</td>
</tr>
</tbody>
</table>
Data Sources

Initial Interviews

The initial interviews with a sample of seven center directors were conducted in May, 1991. The questions asked during these interviews were based on the questions asked on the written survey conducted by Wilson and Kirkland (1987).

The questions were asked in the following order:

1. If you were to start your center again, what would be your top three priorities?

2. Which of the four center functions (teacher training, program development, regional service, and research) does your center emphasize now? Five years from now would your answer be the same?

3. How do you staff your center in terms of people and the percentage of time they devote to your center? With the staff you have, at what level is your center able to perform the center's functions?

4. If you network with schools, what is the process you use to communicate with them?

5. How many years has your center been operating? During this time, how significant has funding from TVA been to your center's programs? Currently, what percentage of your center's total funding comes from TVA? If funding from TVA were to be discontinued next year, what impact would that have on your center and its programs, and why?
Follow-up Interviews

The second set of interviews took place in April and June, 1993, with the directors of the centers at Murray State University, the University of Tennessee-Knoxville, and the University of Alabama in Huntsville. As previously discussed, these directors were chosen because the centers they direct are based at institutions that vary in size, scope, and geographical location. The interviews were designed to provide more in-depth information on the development of the centers and the network. Each of the three directors was contacted and asked to participate in a one-hour telephone interview. In all three cases the directors agreed to participate, and times were arranged for the interviews to take place.

The questions asked during the interviews were developed with input from and approval of the dissertation committee prior to the interviews.

The questions were asked in the following order:
1. How long has your center been in existence?
2. How long have you been director of your center?
3. How does your center fit into the organizational structure of your institution (department, college, etc.)?
4. Does your center have a mission statement?
5. Has your center adopted a set of goals?
6. Which of the four center functions (teacher training,
program development, regional outreach, or research) does your center emphasize now? Has that emphasis changed since you have been director? What might your emphasis be in five years?

7. Which function do you emphasize the least? and why?

8. How is your center staffed? What percentage of your time is devoted to directing your center?

9. To what extent has being a part of the TVA network of centers influenced your center's work/direction?

10. How critical is TVA funding to the current operation of your center? the future operation of your center?

11. Is your center involved in the school reform movement in your state? If yes, has your involvement been influenced by being involved in the network?

12. Is your center involved in international efforts in environmental education? If yes, has your involvement been influenced by being in the network?

Survey Instruments

Additional data were collected through the use of a survey instrument. Two forms of the instrument were developed as part of a pilot to this study conducted in 1988. Form 1 (Appendix B) was developed for use with elementary education teachers. Form 2 (Appendix B) was developed for use with secondary education teachers.

The instruments were based upon the instrument used by Volk, Hungerford, and Tomera (1984) in assessing perceived
curriculum needs based upon the goals for environmental education developed by Hungerford, Peyton, and Wilke (1983). In their study, the Environmental Education Curriculum Needs Assessment Questionnaire (EECNAQ) was developed. This self-administered instrument contained a set of 15 items that were synthesized from the goal statements. To establish content validity of the instrument, Volk et al. (1984) submitted the items, along with content criteria, to a panel of three environmental education experts. The panel provided suggestions from which revisions to the instrument were made.

A pilot study which used the EECNAQ and four additional foil goal statements was also conducted, using a random sample of 20 environmental educators. Analysis of the pilot study results showed that the respondents discriminated between the EECNAQ items and the foil items. Volk et al. (1984) also reported that the instrument had a high level of internal consistency.

Instrument validity

Both instruments used in the present study contain several sets of goal statements. In order to insure that the instruments were valid with respect to content, several steps were taken. During the pilot phase fifteen items were developed for both the elementary and secondary forms. Four statements were developed for both the awareness and knowledge categories, three statements were developed for both the values and skills categories, and two statements for the
participation category. The EECNAQ provided the basis for ten of the statements. This included the four knowledge statements (K.1, K.2, K.3, and K.4), the first two values statements (V.1 and V.2), the three skills statements (S.1, S.2, and S.3), and the second participation statement (P.2). These statements are found in Form 2 in Appendix B. The remaining goals statements were written by the author in consultation with members of the dissertation committee.

All of the items were then reviewed in April, 1988, by all of the directors of the TVA network of centers who were in place at that time. Serving as a panel of experts, suggestions were provided by the directors and revisions were made. Both forms were administered to the directors of the thirteen centers in existence in May, 1988. As a part of the pilot, directors were asked to complete both forms and ask other professionals associated with the centers (e.g. program coordinators) to do so as well. A total of fifteen individuals (twelve directors and three staff members) responded. Respondents were asked to complete Form 1 from the perspective of elementary education teachers. Likewise, they were asked to complete Form 2 from a secondary educator's perspective.

Suggestions for changes in terminology were incorporated into the final forms. If a majority of respondents (i.e., eight or more) recommended deletion of an item then it was removed from the instrument. Therefore, one skills statement
and one participation statement on the elementary form were deleted. The final forms (Appendix B) reflect these changes.

The instruments asked individual respondents to consider each goal statement in light of four separate questions. These questions were:

1. To what extent do you think this goal should be important to the field of environmental education?
2. To what extent do you think this goal should be important to your Center?
3. To what extent do you think this goal should be important to the inservice teacher education function of your Center?
4. To what extent do you think the inservice teacher education function is currently addressing this goal?

Each of the questions was answered on a scale from "1" to "3," with "1" representing "no extent," "2" representing "a moderate extent," and "3" representing "a considerable extent."

Instrument reliability

Both the elementary and secondary versions of the survey instrument were subjected to a test of internal consistency using all of the responses gathered from the directors and teachers. Wilkinson (1989) has reported that the alpha coefficient is a strong reliability measure. The alpha coefficient calculated for the elementary form was .953. The secondary form had an alpha coefficient of .907. Both results
are considered by Wilkinson to be acceptable measures of reliability.

**Procedures**

**The Interview Process**

The initial interviews were conducted during the three-day quarterly meeting of the center directors held in Murphreesboro, Tennessee, in May, 1991. During April, 1991, each of the seven directors representing institutions of varying size, scope, and geographical location was contacted by telephone in order to secure permission for a face-to-face interview to be held at a quarterly meeting of the directors. The interviews were conducted during prearranged times during the meeting. Each interview lasted approximately 45 minutes. Prior to the beginning of an interview, the director involved was told that the questions would be asked in a specific order and that clarification might be requested by the author after a question was answered. All responses were recorded manually by the author. At the end of the interview the author repeated the answers back to the director being interviewed in an effort to ensure accuracy.

The follow-up interviews were conducted in April and June of 1993. The directors of the centers at Murray State University, the University of Tennessee at Knoxville, and the University of Alabama in Huntsville were asked to participate in the interviews. In each case, permission was granted. At that point, a time was scheduled for the telephone interview
to take place. Copies of the questions were then sent to each of the three directors one week prior to the interviews. At the time of each of the interviews the director was told that the responses given would be recorded manually by the researcher and those responses would be read back to them at the close of the interview in order to clarify what had been said and to ensure accuracy.

Table 4 provides a chronological summary of all of the steps involved in the data collection procedures, both for the interviews and the goals survey.

**Administering the Survey Instruments**

The survey instruments were administered to the sample of teachers by mail, and to the directors in person. Those sampled were sent a survey package (Appendix B) which included a letter of introduction, a form for recording demographic information, instructions on how to fill out the goals survey, the appropriate goals survey form (elementary or secondary), and a self-addressed stamped envelope. In order to ensure confidentiality, all components of the survey package were marked with a three digit code. The individual digits indicated the center which served an individual, the teaching level of the respondent (either elementary or secondary), and the individual number assigned that particular teacher. Approximately two weeks after the survey package was sent, a post card was sent to those who had not responded to do so.
<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Data Collection Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>April, 1988</td>
<td>Initial goal statements reviewed by panel of experts</td>
</tr>
<tr>
<td>May, 1988</td>
<td>Pilot instrument administered to directors of centers</td>
</tr>
<tr>
<td>April, 1991</td>
<td>Final instrument sent to sample of teachers</td>
</tr>
<tr>
<td>April, 1991</td>
<td>Initial interviews conducted with seven center directors</td>
</tr>
<tr>
<td>May, 1991</td>
<td>Final instruments administered to center directors</td>
</tr>
<tr>
<td>April, 1993</td>
<td>Follow-up interviews conducted with directors of centers at Murray State University and the University of Tennessee-Knoxville</td>
</tr>
<tr>
<td>June, 1993</td>
<td>Follow-up interview conducted with director of center at the University of Alabama in Huntsville</td>
</tr>
</tbody>
</table>
Data Analysis Procedures

Analysis of the Interview Data

One approach that is being utilized by researchers interested in distilling information collected through verbal or written communications is the procedure known as content analysis. Krippendorf (1980) has described content analysis as a process for making valid inferences from written or oral communication within the context from which it was obtained. In this sense, the process of conducting a content analysis is used to reduce large amounts of data into distinct categories according to a set of predetermined rules. Johnson and LaMontagne (1993) have outlined a step-by-step procedure for conducting such an analysis. The procedure was utilized in this study to analyze the data from the interviews of the center directors. The steps taken included:

1. **Preparation of the data.** The data generated from the interviews were transcribed as was reported.

2. **Familiarization with the data.** All responses were read over and notes were taken on possible themes or categories in which the data could be placed.

3. **Identification of units of analysis.** All references to various factors related to the development of the centers were bracketed, and repetitions were marked.

4. **Identification of tentative categories for coding the responses.** The bracketed responses were then reread and thoughts were combined which seemed to address the same
issue.

5. **Refinement of categories.** A small sample of the responses (10%) were coded into a tentative set of categories. Responses that did not fit into a category were noted. The categories were then refined so that all responses fit into one category or another.

6. **Establishment of category integrity.** Another staff member of the center at Western Kentucky University also coded approximately 15% of the data used for category development. A Kappa coefficient of .89 was calculated to determine the level of inter-rater agreement on these classifications. Johnson and Heal (1982) have indicated that a Kappa of at least .6 provides a good measure of agreement. In this case the consistent placement of responses into categories by both parties provided more confidence in the choice of categories and the coding of the data. At the conclusion of this process, responses place in the various categories were summarized, and are reported in Chapter IV.

**Analysis of the Goals Survey Data**

Upon completion of both surveys by the center directors (n = 13), the responses to four questions regarding the goals were coded according to the method described previously. For each variable the number of responses was calculated, along with maximum and minimum values, the mean, and the standard deviation. This was done using the computer program known as
SYSTAT (Wilkinson, 1989). Means and standard deviations for the directors' ratings were organized into tables (Appendix C) for both the elementary and secondary instruments. Graphs, which are located in Chapter IV, were constructed to visually compare the means of the directors' ratings on both instruments.

Sixty percent of the teacher survey forms (102 of 170) were completed and returned. Upon receipt of the completed survey forms, pertinent demographic data and responses to the goals survey were coded and entered. Again for each variable, the number of responses was calculated, along with the maximum and minimum values, the mean, and the standard deviation.

Tables (Appendix C) were developed to show the means and standard deviations for elementary and secondary responses, as well as for teachers from mature and young centers. Graphs, located in Chapter IV, were constructed to compare the mean responses of the teachers surveyed, including comparisons between the responses of teachers from mature centers and from young centers. Graphs were also constructed to show the differences in means between the elementary and secondary teachers.
CHAPTER IV
RESULTS

Introduction
The major purpose of this study was to identify factors that contributed to the development of the network of university-based centers for environmental education organized by the Tennessee Valley Authority (TVA), and to examine the perceptions of directors and teachers regarding the importance of goals of environmental education. This chapter presents the results of the study, beginning with the results of the interviews conducted with center directors. The results of the interviews are organized in two parts and address the first research question, dealing with factors relating to the development of centers. The first section provides the results of the content analysis of the interview data collected in May, 1991. The second section provides additional information about the three centers that were the focus of additional interviews conducted in April and June, 1993. In this section the interview questions are used as a way to organize and discuss the data. Similarities and differences between the three centers can then be seen more distinctly.
The results of the goals survey data, which focus on research questions two through four, are then presented. These findings relate to the ways that directors and teachers perceive the importance of environmental education goals to the field of environmental education, to their center, and to the inservice function of their center. References to specific tables and figures are noted.

**Content Analysis of Interview Data**

In analyzing the content of the interviews conducted with seven directors during May, 1991, several patterns emerged. First, seven major factors or principles that influenced the development of the university-based centers in the network were identified. In each case, directors provided information on ways that each could be applied. Therefore, the following discussion is organized by the seven principles with additional information provided based on their application in the network.

1. The data indicated that service should be a significant focus for the centers for environmental education. A host institution that recognizes the importance of service to schools and the community will support the center so it can be a visible regional entity.

   Most of the directors indicated that host institutions that value service to schools and the community tend to provide more support than those who do not. They identified several ways in which an institution can
demonstrate support for centers and their programs: (a) by providing housing for the center; (b) by providing maintenance of those facilities; (c) by providing salary for at least part of the staff; and (d) by making the center an integral part of the university's administrative structure.

2. The data indicated that support from a diverse group of funding sources and a broad base of cooperative agreements produces a more stable program and enhances the posture of the host institution.

All but one of the directors' responses supported the notion that it is essential for centers to receive initial funding from those entities that will benefit from the establishment of such a center. However, resources for funding can diminish. Centers that develop diverse sources of funding tend to ensure the continuation and expansion of their programs. Further, all noted that the existence of the network tends to attract funds from organizations that seek to benefit a large population. Sources of financial support include government agencies, private and national foundations, business and industry, and school districts. The data also indicated that networking with groups of people through cooperative arrangements tends to multiply the effectiveness of a center's program. Collaborative efforts with a variety of groups have been pursued,
including faculty and staff in one's own institution, school personnel, members of professional associations interested in environmental education, representatives from business and labor groups, and other centers within the network.

3. With regard to staffing, the interview data indicated that the level of success achieved by the center is generally related to the amount of time dedicated to the center's development by a director and a coordinator, as well as the availability of other support staff.

All of the directors indicated that a center can operate with a staff of any size. To manage the activities of a "full-service" center, however, directors recommended that the staff should include: (a) a director who dedicates at least half of his or her time to center development, which includes procuring funds, establishing short and long-term goals, structure and functions, and maintaining the networking process; (b) a full-time assistant director who coordinates, facilitates, and directs the functions of the center; (c) an administrative assistant who supervises office staff and handles data entry, correspondence, record keeping, and bookkeeping; and (4) volunteers who provide support for community contacts, center publicity, and project promotion and who serve as resources for center functions. In addition, most directors indicated that,
where possible and appropriate, graduate assistants and interns can assume responsibility for special projects, and student workers can assist the staff in center operations.

4. The data strongly indicated that the process of building communication mechanisms within the institution and within the region being served is crucial to the success of the center and to its role as a partner in the network system.

Methods of communication with constituents are typically divided into three major categories: direct contact, indirect contact, and contact through a liaison. Direct contact tends to be an effective means of maintaining rapport through regularly held meetings, formal and informal on-site visits (especially in the schools), phone calls, electronic mail, and teletypewriter transmittal. Indirect contact is usually achieved through newsletters, bulletin boards, mailings, media announcements and interviews, exhibits, electronic communications, and brochures. Using designated representatives from schools and organizations to serve as liaisons between their constituents and the center seemed to have two advantages: personal contact is maintained and the probability of information being disseminated to the intended recipient is greater. Directors also indicated that there is a need to evaluate the effectiveness of the center's methods of communication on a continuing basis.
5. Interview data indicated that a clear sense of direction, established in agreement with the host institution and sponsors of the program, contributes to the center's growth, encourages support for the center's programs, and avoids conflicts in purpose.

It was recommended by four of the directors that the literature in environmental education be examined to find goals which have been established in other programs. They indicated that a plan for establishing and achieving center goals should include the conducting of needs assessments for the populations that the center intends to serve, inventorying the financial, material, and human resources available to meet the needs that will be addressed, and determining the priorities for programs with respect to the primary and secondary goals that are established. Further, it was suggested by five of the directors that responsibilities be assigned for each major program activity, and a timeline be established for implementation, which would include an evaluation component and the individuals and groups that would network in the process.

6. The data also indicated that organizing activities of a center around basic functions provides a framework for planning.

In the process of doing this, functions of the centers (teacher training, program development, regional service,
and research) can be ranked according to the degree of emphasis that is given to each. Emphasis given to functions is determined by needs assessed, resources available, expertise of the staff, and the role of the center as perceived by the host institution. Directors also identified the network as a powerful resource in determining the emphasis of the center. Since the centers share information and actually collaborate on many projects, the strengths or emphases of one center serve to enhance the ability of another center to build on its own emphases.

7. The interviews also supported the creation of a broad-based, interdisciplinary advisory committee as being integral to the success of the center's program.

All of the directors indicated that the population represented by an advisory committee varies according to the needs of the center. It can help move the center toward its goals. This is accomplished where the committee provides guidance in assessing the needs of the region, insight into the most appropriate method for reaching a particular audience, expertise in issues addressed, and a sense of community perspective of the center's role and the issues being addressed. In addition, advisory committees provide support in carrying out the center's programs and help in the procurement of additional resources, while providing an additional
mechanism for evaluating the effectiveness of center programs.

Results of the 1993 Follow-up Interviews

In an effort to gain additional information about the centers and their relationship to the TVA network, interviews were conducted in April and June of 1993 with the directors of the centers at Murray State University, the University of Tennessee at Knoxville, and the University of Alabama in Huntsville. As mentioned in Chapter III, these centers were chosen for this phase of the study because they serve quite different geographical areas, the institutions which host them differ significantly in terms of historical focus and size, and they represent a mature center and two young centers in terms of the parameters established in this study. Murray State serves a rural portion of west Kentucky, has a student enrollment of about 7,000, began as a teacher's college, and was the first center created in the TVA network. The University of Tennessee at Knoxville sits in a relatively large metropolitan area, is the land-grant institution in Tennessee, has an enrollment of approximately 25,000 students, and established its center in 1985. The University of Alabama in Huntsville is a fairly new institution (25 years old) and was created to provide a partner in higher education in the research and development activities of such organizations as the National Aeronautics and Space Administration and Redstone Arsenal. It has an enrollment of 8,000 students, and the
center was created as a part of the Johnson Energy Center in 1985.

Even though these institutions are quite different, the three centers have cooperated on a number of joint projects, including a current effort relating to international environmental education.

The responses given by the three directors to the interview questions are discussed together in order to compare and contrast the centers. Several of the questions that were asked have been combined into single statements. Table 5 provides a summary of the responses.

1. How long has your center been in existence, how long have you been the director, and how does the center fit into the organizational structure of the institution?

The center at Murray State University (MSU) was the first center created with the assistance of TVA. This occurred in 1976, one year after TVA helped to set up the West Kentucky Environmental Education Consortium, a cooperative of twelve school districts. The Consortium became the basis for the inservice teacher education function of the center as it was formally organized at the university in 1976. The center is an entity of the Department of Elementary and Secondary Education in the College of Education, and the current director has been in place for four years.

The center at the University of Tennessee at Knoxville (UTK) was organized in 1985. The center was originally placed
Table 5
Summary of Responses of Follow-up Interviews Conducted with the Directors of the Centers at Murray State University (MSU), the University of Tennessee at Knoxville (UTK), and the University of Alabama in Huntsville (UAH)

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>MSU</th>
<th>UTK</th>
<th>UAH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center created</td>
<td>1976</td>
<td>1985</td>
<td>1985</td>
</tr>
<tr>
<td>Years director</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Organizational placement</td>
<td>Department of Elementary and Secondary Education, College of Education</td>
<td>Joint between colleges of education and liberal arts</td>
<td>Joint between Division of Continuing Education and Earth Systems Space Lab</td>
</tr>
<tr>
<td>Mission statement?</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Center Goals?</td>
<td>Developed annually</td>
<td>Developed annually</td>
<td>Developed as needed</td>
</tr>
<tr>
<td>Which function emphasized?</td>
<td>Preservice teacher education</td>
<td>Research</td>
<td>Program Development</td>
</tr>
<tr>
<td>Emphasis will change?</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Center staffing?</td>
<td>Director-25%</td>
<td>Grad assist. Work-studies</td>
<td>Director-25%</td>
</tr>
<tr>
<td>TVA Funding Crucial?</td>
<td>No, but gives flexibility</td>
<td>No, but gives flexibility</td>
<td>No, but gives flexibility</td>
</tr>
<tr>
<td>Network influenced direction of center</td>
<td>Yes, provides support system and additional expertise</td>
<td>Yes, provides support system and additional expertise</td>
<td>Yes, proves support system and new direction</td>
</tr>
<tr>
<td>Involved in school reform?</td>
<td>Yes, because of KERA</td>
<td>No</td>
<td>Only in small way</td>
</tr>
<tr>
<td>Involved in international efforts in EE?</td>
<td>Yes, Czech., Ecuador and Russia</td>
<td>Yes, Brazil and Russia</td>
<td>Russia</td>
</tr>
<tr>
<td>Because of network?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
in the Department of Curriculum and Instruction in the College of Education. However, in 1991 the center became a joint effort of the College of Education and the College of Liberal Arts. This is due in part to the change in name from the Center for Environmental/Energy/Science Education to the Center for Geography and Environmental Education, which happened one year after the current director took the position in 1990.

The center at the University of Alabama in Huntsville (UAH) was also organized in 1985, as a program of the Johnson Research Center. In 1991, the center was reorganized as a joint effort of the Division of Continuing Education and the Earth Systems Science Laboratory. This was done in an effort to be more accessible to the academic programs of the university and still be attached to the technically-oriented university research program. The director has been in place for two years and is the part-time director of the university's Environmental Studies Program and the Earth Systems Science Laboratory.

2. Does your center have a mission statement and/or has it adopted a set of goals?

The mission of the center at MSU is to provide environmental education resources and programs to regional schools and communities, to develop, field-test, and disseminate environmental education curricula, and to provide preservice and inservice training in the broad area of
environmental education. Programmatic goals are developed each year by the director, in cooperation with the center advisory committee. Current objectives deal with changing the mobile program known as the Environmental Van, which serves school districts in the region, so that it more accurately reflects the aims of the Kentucky Education Reform Act. In addition, specific goals related to computerizing the environmental resource library in order to provide better access for students and teachers, and a significant effort in making the overall program more global and international in scope, were mentioned. A major goal for the future relates to creating new connections with the economic education program at MSU.

The UTK center mission statement has changed focus in the last year from service to the surrounding community to research, development and policy. The changes are attributed to changes in the economy, the environmental education movement, and the leadership of the center. Goal statements, as at MSU, are created on a yearly basis in an effort to reflect the changes that the center may be experiencing. Also like the MSU center, the goals are considered to be organizational in nature, and not necessarily philosophical. They currently focus on nurturing more on-campus support, and becoming more established as a recognizable entity, with a more secure financial base. However, the director did indicate that the center was currently beginning to develop a
five-year plan.

At UAH, the director indicated that the center's unstated goal involved bringing the center more solidly into the infrastructure of the university. At this time, no formal mission statement exists. The need to become a visible entity that would be recognized by both the academic and research components of the campus were stated as the immediate objective of the center. These two components of the university were said to often be at odds and the director felt that, at least in the area of environmental education, the center may be able to become a mediating and synergistic force.

3. Which of the four functions of your center are emphasized the most and the least? Have those emphases changed since you became director and do you think they will change in the next five years?

Having established an inservice teacher education program in the early years, the MSU center is now emphasizing its preservice program. The center now provides training in environmental education for all elementary and secondary teacher candidates as a university requirement for graduation. This training takes place as students learn to teach both science and social studies. In addition, service to schools and the communities in the region has continually been emphasized, even though service tends not to be rewarded (in terms of faculty recognition) as much as research. At this
point, the director at MSU did not anticipate much change in emphasis in the next five years, and mentioned funding as a major constraint in how much more could be done in the future.

Even though the director of the center at UTK stated that she personally values service to the community, it does not receive much support from the university. The university tends to think of itself as a research institution first, and programs such as the center must be programmed with that in mind. In addition, the UTK center has recognized that there are many organizations in the community which offer teacher training experiences in environmental education. Therefore, the center is becoming more a broker with regard to the teacher training function, striving to provide linkages for teachers interested in environmental education experiences with the resources that exist in the region.

Program development has always been the major emphasis of the center at UAH, even during the time that the center was housed in the Johnson Research Center. The programs that have been developed have tended to relate to energy education, remote sensing, and global change education. Much of the program development has been accomplished through the sponsorship of state and federal energy management agencies and the National Aeronautics and Space Administration (NASA) which has many offices in Huntsville. Although more attention has been given to the development of teacher education opportunities in the past two years, the center anticipates
that program development efforts related to technology will continue to receive the highest priority. The director did indicate that this could change if additional staff were to added to the basic operation of the center.

4. How is your center staffed, what percentage of your time is devoted to directing the center, and how crucial is TVA funding to your center?

Directors of all centers said the amount of time that they have to officially direct their centers has fluctuated over their tenure as directors. The MSU director has always had at least 25% of her time devoted to the center. She notes, however, that the actual time needed to do what she needs to do far exceeds that percentage. When part of her teaching load includes courses in environmental education, she considers that time as contributory to the center. Her entire salary is a regular, hard-line entity of the university budget.

The director of the UTK spent one year with no time officially allocated to her to direct her center, but she continued to do so. She currently is assigned 25% time as director of the center. However, all of her salary comes from the soft money provided by grants and contracts.

The director of the center at UAH indicated that he is the full-time director of the center. However, he added that he also serves as the half-time director of the Environmental Studies Program and the half-time director of the Earth
Systems Science Center, which means that his appointment as director of the center is largely one that exists because he has chosen to put in the time it needs to make it work. This tendency to do what it takes to operate the program was consistent in all three institutions.

All three directors indicated that their centers are on a maintenance contract with TVA. These are contracts which provide funds to attend meetings of the networks, fund the center newsletter, and defray the costs of materials for workshops and resource collections. Each said that the loss of this minimal amount would not result in the loss of their center. However, each director mentioned that the maintenance money provided them with a very flexible pot of resources that can be used in ways that are less constrained than other sources of available funds.

All three center directors utilize graduate assistants, interns, and student workers to help carry out the day-to-day operations of their centers. Each mentioned that although this type of staffing is cost-effective, a full-time assistant director or program coordinator is necessary if the centers are going to be able to do much more than they are currently doing. Only the UAH employs such a person. That soft money position is supported through a variety of grants and contracts.

5. To what extent has being a part of the TVA network of centers influenced your center's work/direction?
The directors of all three centers responded strongly that membership in the TVA network was highly influential in the evolution of their centers. As directors who have been in place for less than four years, they all stated that the network had helped to ground them when they took their current positions. They spoke of the support system that the other directors across the network provided them as they worked to establish their centers as entities that reflect not only on their own individual expertise, but the historical connections that had been created by being part of the network. Each felt that their centers could not only specialize in a particular function or program area but that each had something to contribute to the overall resources of the network. Each mentioned that many of the programs they are currently working on have come from ideas generated though discussions with other center directors at scheduled directors' meetings, as well as through other communication mechanisms. With the somewhat different organizational setting of the center at UAH, the director said that the network brought him into contact with directors that traveled in different circles and that his involvement in the network had expanded the focus of his center.

6. Is your center involved in school reform movements in your state? If so, has your involvement been influenced by being in the network?
The director of the center at UTK did not feel that her center was being impacted significantly by any school reform movements in Tennessee. She indicated that the most recent reforms occurred in the early 1980s and she could not judge their impacts since she did not move to the state of Tennessee until 1989. Likewise, the director of the UAH center indicated that, other than the attempt to become more involved in a new experience-based science program that was developing in Alabama, he did not see school reform as a focus of the center.

In contrast, the director of the MSU center indicated that she is highly involved in the reforms being implemented currently as a part of the Kentucky Education Reform Act (KERA) of 1990. With the entire public school system of the state being declared unconstitutional in 1989, wholesale changes are occurring in the state with regard to the ways schools are financed and governed, and how students are being assessed. The MSU center director indicated that the overall goals of KERA lend themselves to the mission of her center, and she viewed KERA as an opportunity for environmental education to become an important part of school curricula. However, she did not feel that the network had played a significant role as yet in her center's involvement in KERA, other than through several joint projects with Western Kentucky University's center, which is the only other center in the network that is in Kentucky.
7. Is your center involved in international efforts in environmental education? If yes, has your involvement been influenced by being in the network?

All three center directors were particularly enthusiastic in their responses to this question. Each center is involved in international projects in environmental education in Latin America, Eastern Europe, and Asia. This included UTK's prior involvement in Brazil, and MSU's cooperative projects in Ecuador and Czechoslovakia, and the current involvement of each center in Russia. The activities in Russia were emphasized by each of the three directors.

Through a formal memorandum of understanding between the Tennessee Valley Authority and the Rostov Oblast (i.e., region) environmental protection agency, as well as the universities in the TVA network and Rostov State University, a comprehensive environmental education project is evolving. During the past two years, several exchanges of university faculty, school teachers, resource managers, and high school students have occurred. The exchanges have dealt with several efforts to share interests, expertise, curricula, and program information. Rostov State University is currently working with the Russian Ministry on Higher Education and Science to create a network of centers for environmental education in the region forming the Don River watershed that is very similar in geography to the Tennessee Valley region.
The directors at MSU and UTK mentioned a new project currently being planned, the "River to River Project." The project is being organized in the United States by the centers at UTK and MSU, in cooperation with TVA and the Citizen Exchange Council (CEC), a nonprofit organization specializing in U.S.-Russia exchanges. The project will involve teachers from both regions floating portions of the Don River and the Tennessee River together over the course of two summers. The teachers will be planning curriculum activities and communication mechanisms that will allow schools from both countries to collect data on their respective watersheds and share information with each other.

The UAH center is the center that provided the technology and training to create a telecommunication system that links five high schools in the Rostov region, along with Rostov State University, to schools and universities in the Tennessee Valley. In this way, UAH will be a potential partner for future projects resulting from this international networking effort. Each director credited the network as the sole reason that they are involved in the arrangement with Russia.

Results From the Goals Survey Data Analysis

Research questions two through four were addressed through the use of the survey instruments regarding goals for environmental education. The four component questions are related to the importance of goals for environmental education to the field of environmental education, importance to the
center, importance to the inservice teacher education function of the center, and the extent to which the goals are being addressed by the inservice teacher education function of the center.

**Results for Center Directors**

The entire population of directors of university-based centers for environmental education completed both the elementary and secondary forms of the goals survey. The means and standard deviations for the directors' responses to the survey are presented in Tables 6, 7, 8, and 9 (Appendix C). Though this population is small by statistical standards, a visual inspection of the means of each of the responses shows some differences.

Figure 1 is a graph of the means for the directors' ratings on both the elementary and secondary forms on the importance of goals to the field of environmental education. The graph indicates that the directors generally rated the goals higher on the secondary form than the elementary form. The only deviation from this pattern is found when examining the ratings of the first value goal statement, which relates to students acquiring a better awareness of their own feelings about the environment.

Figure 2 is a graph of the means of the directors' ratings on the two forms regarding the importance of goals to
Figure 1: Means of the Directors' Ratings on the Importance of Goals to the Field of Environmental Education.
Figure 2: Means of the Directors' Ratings on the Importance of Goals to the Center.
their center. Visual inspection of the figure indicates that directors generally agreed on their ratings of goals on both the elementary and secondary forms. They did rate the values goals higher on the elementary form than on the secondary form.

Figure 3 is a graph of the means of the directors' ratings on the importance of goals to the inservice teacher education function of their center. For the most part, the directors rated all of the categories of goals slightly higher on the elementary form than on the secondary form.

Figure 4 shows a similar pattern. The directors' ratings on the extent that goals for environmental education are already being addressed by the inservice teacher education function of their center tend to be higher for the elementary form than for the secondary form. However, the overall pattern in Figure 4 indicates that this question produced lower ratings than the three previous questions. For example, Figures 1, 2, and 3 have no individual goals rated below 2.61. Figure 4 shows all goals rated below 2.46 and twelve goals with ratings at or below 2.00.

**Results for Teachers from Mature and Young Centers**

Figure 5 is a graph of the means of the responses by teachers from mature centers and from young centers on the importance of goals to the field of environmental education. Visual inspection of the graphs shows very little difference between the responses of these two groups of teachers.
Figure 3: Means of the Directors' Ratings on the Importance of Goals to the Inservice Teacher Education Function of the Center
Figure 4: Means of Directors' Ratings on the Extent that Goals are Currently Addressed by the Inservice Function of the Center.
Figure 5: Means of Teachers' Ratings from Mature and Young Centers on the Importance of Goals to the Field of Environmental Education.
Teachers from both groups ranked the values goals lower than the goals in the other four categories.

Figure 6 displays the means of the ratings by teachers from mature centers and from young centers on the importance of goals for environmental education to their centers. Again, there were few differences in the way these groups responded to this question.

Figure 7 is a graph of the means of the ratings by teachers from mature centers and from young centers on the importance of goals for environmental education to the inservice teacher education function of their centers. Teachers from young centers generally rated the goals higher than teachers from mature centers. Both groups rated the values goals lowest, with the exception of the last participation goal (P.2) which received the lowest rating by the teachers from young centers.

The means of the ratings by teachers from mature centers and from young centers on the extent that environmental education goals are currently being addressed by the inservice teacher education function of the centers are shown in Figure 8. In general there were few differences in the ratings, although teachers from mature centers did rate the goals slightly higher than teachers from young centers.

Results from Elementary and Secondary Teachers

The ratings on the goals survey by the sample of teachers were also examined based upon the classification of a teacher
Figure 6: Means of Teachers' Ratings from Mature and Young Centers on the Importance of Goals to the Center.
Figure 7: Means of Teachers' Ratings from Mature and Young Centers on the Importance of Goals to the Inservice Teacher Education Function of the Center.
Figure 8: Means of Teachers' Ratings from Mature and Young Centers on the Extent that Goals are Currently Addressed by the Inservice Function of the Center.
as elementary or secondary. Since the elementary form of the instrument contained three less goal statements than the secondary form, figures created to show possible differences between the ratings of the groups have three goals that have means only for secondary teachers' ratings.

Figure 9 is a graph of the mean ratings by both groups of teachers on the importance of goals to the field of environmental education. There was little difference between the ratings of the goal statements by elementary and secondary teachers. Both groups rated the goals associated with the categories of values and skills lower than the awareness and knowledge goals, with the exception of the skills goal that relates to helping students acquire a better awareness of their own feelings about the environment (S.1).

A similar pattern emerged in Figure 10, which plotted the means of the ratings of elementary and secondary teachers on the importance of goals for environmental education to their center. Few differences exist between the ratings of both groups on most of the goal statements. The lowest ratings by both groups were again goals relating to values and skills, with the exception of the first skills goal (S.1). The participation goal (P.1) was rated higher by elementary teachers than by secondary teachers, although this was the only participation goal on the elementary instrument.

Figure 11 is a graph of the mean ratings of elementary and secondary teachers on the importance of goals to the
Figure 9: Means of Elementary and Secondary Teachers' Ratings on the Importance of Goals to the Field of Environmental Education.
Figure 10: Means of Elementary and Secondary Teachers' Ratings on the Importance of Goals to the Center.
in-service teacher education function of the center. The graph indicates a consistent pattern of higher ratings by elementary teachers than by secondary teachers. The graph also indicates that both groups rate goals associated with values generally lower than the other goals. The elementary teachers did rate the first participation goal (P.1) higher than the secondary teachers. However, this goal was the only participation goal statement on the elementary form.

The means of the ratings by elementary and secondary teachers on the extent that environmental education goals are currently addressed by the inservice teacher education function of the center are shown in Figure 12. Although there is little disagreement on the ratings of the goal statements, the ratings are consistently lower for both groups than the ratings in Figure 11. Also, the pattern of rating values goals lower than awareness and knowledge goals continued, as well as the rating of the first participation goal by elementary teachers higher than secondary teachers.

Additional visual comparisons can be made on each question between the responses the directors and the various groups of teacher. For example, few differences exist between the directors' ratings and the ratings of all of teacher groups with regard to the extent that the goals are important to the field of environmental education (figures 1, 5, and 9).
Figure 11: Means of Elementary and Secondary Teachers' Ratings on the Importance of Goals to the Inservice Teacher Education Function of the Center.
Figure 12: Means of Elementary and Secondary Teachers' Ratings on the Extent that Goals are Currently Addressed by the Inservice Function of the Center.
When comparing the ratings of directors with the ratings by the groups of teachers on the importance of goals to the centers (figures 2, 6, and 10), the directors consistently rated all of the goals higher than the teachers, especially when comparing directors' ratings to the ratings of elementary and secondary teachers.

Directors also rated the goals higher than elementary and secondary teachers on the importance of goals to the inservice teacher education function of the centers (figures 3, 7, and 11), particularly with regard to the values and skills goals. However, when comparing the directors' ratings and the elementary and secondary teachers' ratings on the extent that goals are currently being addressed by the inservice function of the centers, the directors consistently gave lower ratings than did both the groups of elementary and secondary teachers.
CHAPTER V
DISCUSSION

Introduction

The purpose of this study was to identify factors that have contributed to the development of the network of university-based centers for environmental education organized by TVA, and to examine the perceptions of directors and teachers regarding the importance of goals for environmental education. To do that, research questions were addressed that related to factors affecting the development of the centers and various perceptions of certain stakeholders in those centers on goals for environmental education.

This chapter discusses the results of this study in light of the research questions and addresses the limitations of the study. In addition, it addresses the implications of the results and provides some suggestions for future research.

Discussion of the Results of Interviews

Research question one was concerned with identifying factors related to the development of university-based centers in the TVA network. The results of the analysis of the interview data collected from center directors in May, 1991, presented seven such factors. Examples of how directors
addressed each factor were discussed in Chapter IV. These results provide the basis for restating the factors in the form of recommended guidelines for centers that might join the network in the future.

Guideline #1. The host institution of a center should include service as an integral part of its philosophy. This recommendation is supported directly by the analysis, which indicated that host institutions that value service to schools and the community tend to provide more support to the center than those who do not. Since a major attribute of the networking process is making linkages with all parties involved (Lipnack & Stamps, 1986) this recommendation applies both to the centers and the networks to which they belong.

Guideline #2. The center should have a strong, diverse base of support. This recommendation encompasses the results of the interview analysis, along with the qualities of networks discussed in chapter II. In this regard, centers must be supported by a broad array of interest groups and individuals (Wilson & Kirkland, 1987). This recommendation is also supported metaphorically through the ecological principle that says that diverse natural communities tend to be more stable than monocultures.

Guideline #3. The center staff should include a director who has the authority to develop the center, as well as a full-time assistant director who is responsible for managing the programs. The relationship of the time available for
center staff to actually devote to their center's programs and the scope and quality of those programs was substantiated throughout the interviews. Staffing patterns can vary from institution to institution, but a commitment from the host institution to providing adequate staff was determined to be very important.

Guideline #4. A strong network of communication must be established and maintained. This recommendation seems to be important in terms of networking within a center's service region and with regard to networking with other centers and other networks. It is supported by the basic notion that networks tend to be decentralized and reticulate, continually forming new connections (Gerlach and Hines, 1970).

Guideline #5. Specific attainable goals for the center should be established. As indicated in the analysis, these goals may be either programmatic or philosophical in nature. In either case, a sense of direction is provided by establishing goals for centers (Wilson & Kirkland, 1987).

Guideline #6. Functions of the center should be identified and ranked according to the degree of emphasis given to each. In the case of the TVA network, the functions of teacher training, program development, regional service, and research were accepted as a prerequisite for becoming part of the network. However, the process of ordering the functions in terms of priority provides the centers with an opportunity to select and develop their own foci, and
contributes to the diversity of the network.

Guideline #7. An advisory group should be formed to help guide the center's development. An active and supportive advisory group seems to provide centers with a way to stay grounded with its constituents. This organizational entity can also serve to diversify and decentralize the center's programs and funding sources.

The follow-up interviews conducted in the Spring of 1993 with the directors of the centers at Murray State University, the University of Tennessee at Knoxville, and the University of Alabama in Huntsville supported the above recommendations. In addition, the responses to the expanded set of questions tended to provide more depth about the centers involved and, to a certain extent, the entire network. The data seemed to reveal additional considerations involved in the process of directing a university-based center for environmental education, such as the effects of university reward systems on the ways that directors focus their work. In addition, the network was directly credited for the centers' involvement in several programs and the accomplishments that resulted. The network tends to be a support system and a delivery mechanism for programs and products initiated by members of the network, whether it be the centers involved, teachers served by the centers, the Tennessee Valley Authority, or other stakeholders in the centers.
Discussion of Results of Goals Survey

Research questions two through four were addressed through the administration of a survey instrument designed to measure the perceptions of center directors and teachers on the goal statements relating to the categories of awareness, knowledge, values, skills, and participation. Each question explored how directors and teachers viewed the importance of each goal to the field of environmental education, to their center, and to the inservice teacher education function of their center. Directors and teachers were also asked to determine to what extent the goals were already being addressed by the inservice teacher education function of their center. This section discusses the results of the analyses of the responses to the survey instrument and is organized in order of research questions two through four.

Directors' Responses

Directors of the centers completed both the elementary instrument and the secondary instrument. Visual inspection of the means of their ratings revealed relatively high ratings for all of the goals as they relate to the field of environmental education, their centers, and the inservice function of their centers. More specifically, ratings on the importance of goals to the field of environmental education were slightly higher for secondary education than for elementary education. However, with regard to the importance to their center the ratings were higher for elementary
education. When relating the importance of the goals to the inservice function of their centers the directors seemed to emphasize awareness and knowledge goals at the elementary school level, and values, skills, and participation goals at the secondary level.

When asked to rate the extent that goals are currently being addressed by the inservice function of their centers, the ratings dropped considerably from the first three comparisons. This indicates that directors feel that considerable work needs to be done to reach the various goals through their centers' inservice teacher education activities.

Responses of Teachers from Mature and Young Centers

Research question three related to how teachers from mature centers and from young centers might differ in their perceptions of environmental education goals. Visual inspection of the means of their ratings showed few differences between the ratings of the two groups on the importance of the goals to the field of environmental education and to their centers. When rating the importance of goals to the inservice teacher education function of their centers, the teachers from young centers did rank the goals higher than the teachers from mature centers. This would indicate that the younger centers in the network emphasize the goals through their inservice activities more than the original centers in the network. This is supported by Wilson
and Kirkland (1987) who found that directors tended to develop the inservice teacher education function of their center early in the development of their center. In contrast, the teachers from mature centers tended to give slightly higher ratings than teachers from young centers when considering to what extent the inservice function of the center is currently addressing the goals. As with the directors, all of the ratings by teachers from both mature and young centers on the extent that goals are currently addressing the goals are lower than their perceptions on the importance of the goals to this function of their center. This indicates a need to do more to meet the goals through the centers' inservice activities.

**Elementary and Secondary Teachers' Responses**

Research question four contains the same component questions as question three, but focuses on the perceptions of elementary and secondary teachers served by the centers. In each, the results indicated that elementary teachers consistently consider the goals for environmental education more important than secondary teachers, with regard to importance to the field of environmental education, to their centers, and to the inservice function of their centers. In addition, goals related to the categories of awareness, knowledge, and participation tended to be more important to elementary teachers than values and skills goals. The inclusion of the participation goals in this finding differs from results of earlier research into elementary and secondary
teachers' perceptions of the goal levels (Volk et al., 1984; Harvey, 1976). Those studies of goals suggested that elementary and secondary teachers tend to place more emphasis on awareness and knowledge, and less on values, skills, and participation. It must be noted, however, that the participation portion of the elementary instrument contained only one goal statement, so caution must be used in making any generalizations based on this finding.

Secondary teachers, on the other hand, tended to rate the importance of the goals in a more predictable manner, with awareness and knowledge receiving the highest ratings, and a more "flattened" and less important set of ratings for values, skills, and participation. For both the elementary and secondary teachers, goals related to values were consistently rated the lowest in importance. Perhaps the difficulty that most teachers tend to have with regard to "teaching values" contributes to this low rating.

There was general agreement between elementary and secondary teachers with regard to perceptions on the extent that the inservice teacher education function of their center is currently addressing the goals. However, when individual goal statements were considered, elementary teachers consistently rated awareness, knowledge, and participation goals as being addressed more than skills and values goals. Secondary teachers rated knowledge goals higher than the other goal categories when considering importance to the inservice
function of their center. The first participation goal (P.1) was rated highly and this result differed somewhat from the results found in other studies (Volk et al., 1984; Pomerantz, 1990). The rating of the second participation goal (P.2) was in keeping with previous research as it was rated lower than any other goal statement by the secondary teachers.

**Limitations of the Study**

There were several limiting factors related to the design of this study which lessen the ability to generalize from some of the results.

1. A large amount of information was gathered through the follow-up interviews conducted in 1993, and this information was useful in providing a broader perspective on the centers in the network. However, if such interviews were conducted with all seven of the centers studied in the initial interview process, perhaps a set of parameters could have been identified that would have provided a more complete description of the diversity of the centers in the network. This could have made it possible to determine which centers could serve as models for different types of center activities.

2. The survey instrument used in this study was flawed and this limited its use in attempting to reach strong conclusion about the perceptions of various stakeholders regarding the importance of environmental education goals. Because the secondary form had three more items than the
elementary form, any comparisons involving categories with unequal numbers of statements were difficult to justify. This prevented the comparison of the responses by several different groups through statistical tests such as analysis of variance. Although graphing the means is considered a legitimate approach to making initial comparisons (Gay, 1981), a better instrument would have yielded more insight into the centers.

As mentioned in Chapter III, each form of the instrument contained goal categories with different numbers of goal statements. The knowledge category on the secondary form contained four goal statements while the elementary form had three. The skills category contained three statements on the secondary form and two on the elementary form. The participation category contained two statements on the secondary form and only one on the elementary form. This weakened the confidence of the visual analyses which involved these goal categories. This was most evident in the somewhat surprising result regarding the high rating of participation goals by elementary teachers. Such results have less of an impact on the study than if the two forms of the instrument had contained an equal number of goal statements per category.

3. Conducting research using an entire population of directors of centers for environmental education can have its advantages. However, because the TVA network of university-based centers was the focus of this research, the author was limited to only those directors. The number of center
directors in the population is small for any type of confident quantitative analysis. While it was considered worthwhile to survey the directors, the observer is limited to simple visual analysis techniques to compare the responses of a small number of individuals.

4. The number of teachers sampled from each center proved to be too small to analyze possible differences between responses in relationship to most of the demographic data collected. The frequency tables showing the demographic information do help to understand the kinds of teachers being served by the network. However, subsequent researchers studying this network should consider increasing the sample sizes in order to allow for other comparisons.

5. The frequency tables provided a sense of the range of teachers who are served by the centers in the TVA network. However, it must noted that any findings derived from the sample of teachers can only be generalized to the teachers served by the centers. It would be inaccurate and inappropriate to generalize the findings of this study regarding the teachers in the sample to a broader audience.

Implications of the Study

This study suggested some practical guidelines related to the development of university-based centers for environmental education. The guidelines can provide direction for new centers in the TVA network or for new centers in other regions as well. They include recommendations on the importance of
service as a role for the host institution, the need for diverse support systems for the center, and the kinds of staffing requirements needed for a fully functioning center. In addition, it is recommended that strong communication networks be created, and the specific goals and functions of the center should be carefully delineated and prioritized. As a linkage to the center's constituents, an advisory committee is recommended in order to keep the center's programs in line with its goals and functions.

Some of the benefits of being a member of a network of centers for environmental education have also been identified in the study. In the case of the TVA network, the centers involved tend to maintain a unique identity, while using the other centers in the network as an expanded pool of resources, providing ideas for collaborative projects that can maximize the expertise that exists in different institutions. The network tends to be decentralized in this regard, with centers indicating that they are no longer dependent on the original sponsor of the center network. This ability to survive the process of losing the seed money provided by TVA is not generally supported in the history of federal support to environmental education or in education in general. Many of the environmental education programs that have been started by federal grants did not continue to exist after the federal dollars stopped flowing (Judy, 1993). The support system created by the network seems to have generally contributed to
the existence of a "win-win" situation, where competition is minimal and cooperation is considered essential.

In examining the perceptions of various stakeholders in the network with regard to the goal statements considered in the study, some expected differences were evident, such as the differences between elementary and secondary teachers' ratings of the importance of the goals.

In contrast, it did not seem to matter much if a teacher was served by a mature center or a young center with regard to his or her perspective on the importance of goals to the field of environmental education and to the center. The small differences noted regarding the higher ratings by teachers from young centers on the importance of goals to the inservice teacher education function of their center was consistent with previous findings on the development of inservice activities in environmental education by centers (Wilson & Kirkland, 1987).

Investigating the individual goal statements revealed some traditional differences when comparing the higher rankings of awareness and knowledge goals for groups of teachers to the lower rankings of values and skills goals. However, an unexpected difference, when comparing the results to previous studies (Volk et al., 1984), occurred when elementary teachers consistently rated participation goals highly. The limitations of the instruments used lessen the ability to explain this difference.
Additional comparisons made between the responses on the goals survey by the directors and the groups of teachers showed that, in general, directors rated the goals as more important to the field of environmental education, to their centers, and to the inservice teacher education function of their centers than any of the groups of teachers. This was particularly evident in comparing the directors' responses with both the elementary and secondary teachers' responses on the importance of the goals to the inservice function of their centers. This comparison suggests that, as directors of centers for environmental education, they emphasize the importance of the centers' inservice function as an important vehicle for impacting the teachers that they serve.

In contrast, the directors' ratings on the extent that the centers are currently addressing the goals through the inservice function of the centers were consistently lower than all of the teacher groups. This suggests that directors perceive that more must be done with more teachers of all types through the inservice function of the centers.

The findings relating to goals do provide some questions for the network. Do the constituents of the centers know "up front" what the goals of environmental education are, as well as the goals of the center's program? Should the network consider clarifying the goal categories? If values are not emphasized, why not? What are the approaches that are being used to address values? What specific skills are involved in
environmental education? How can we focus more on the skills associated with environmental literacy? How is attention to values and skills operationalized within the center's function? Perhaps more attention is needed in clarifying the purposes of the centers in terms of their goals and functions.

Suggestions for Further Research

The focus of this study was the network of university-based centers organized by the Tennessee Valley Authority in portions of six southeastern states. It was the first attempt to empirically characterize the TVA network, or for that matter, any network of university-based centers for environmental education. Additional studies are needed which replicate the study in other geographical areas, using different types of centers, with different types of host institutions. This would test the implications of the study in an effort to refine, and perhaps reject, the recommendations produced in this study.

The study provided some baseline data for the TVA network as well. Additional studies are needed to refine the questions asked and to ask new questions. Studies with larger sample sizes could answer research questions about the relationship of certain demographic characteristics of respondents that could not be addressed in this study because of the sample sizes represented.

With regard to the questions addressed about goals for environmental education, studies are needed as to how to
improve the perception of various groups on the importance of goals related to values and skills. Follow-up investigations into the emergence of participation goals may provide insight into additional benefits of networking efforts in environmental education. Studies are also needed which specifically compare the general programmatic goals addressed in this study with the curriculum goals addressed in the work of Hungerford, Peyton and Wilke (1983).

This study has produced some results that relate to the characteristics of a network of centers for environmental education. As with any study providing baseline information, it should be replicated in an effort to answer additional questions about the concept of centers for environmental education and the possibilities for networking that exist. The practical application of these findings should be challenged, refined and shared in the future. As the global community becomes more connected, networking may prove to be the most effective vehicle for protection of the health of the planet. There is indeed much more to be learned.
The TVA-Sponsored Centers for Environmental Education
Listing of TVA-Sponsored Centers for Environmental Education, 1993

Bear Creek Watershed Environmental Education Project
Mr. Allan M. O'Neal, Jr., Director
Russellville, AL 35653

Cedar Creek Learning Center
Mr. Doug Ratledge, Director
Ms. Violet Carlos, Assistant Director
Greene County Schools
910 W. Summer Street
Greeneville, TN 37743

Center for Environmental/Energy and Science Education
Dr. Charles F. Rhyne, Director
Plant Science Building
Jackson State University
Jackson, MS 39217

Center for Environmental/Energy Education
Dr. Ron Cleminson, Director
College of Education, Room 415B
Memphis State University
Memphis, TN 38152

Center for Environmental/Energy Education
Dr. Padgett Kelly, Director
Dr. John Duboise, Co-Director
Middle Tennessee State University
Murfreesboro, TN 37132

Center for Environmental Education
Dr. Ruth Jacquot, Director
Murray State University
Murray, KY 42071

Center for Science, Mathematics, and Environmental Education
Dr. Susan P. Gannaway, Director
Education Building, Room 306
North Georgia College
Dahlonega, GA 30597-9990

Center for Environmental/Energy Education
Dr. Joe Sharp, Director
301 Bartoo Hall
Tennessee Technological University
Cookeville, TN 38505
Center for Environmental Education
Dr. Jackie Batson, Director
Tennessee Wesleyan College
Athens, TN  37303

Environmental/Energy Education Program
Mr. Gregory Cox, Director
SB 201
University of Alabama in Huntsville
Huntsville, AL  35899

Center for Environmental, Energy, and Science Education
Dr. Earl Gardner, Director
Dr. Mary Lou Meadows, Co-Director
Math Building
The University of North Alabama
Florence, AL  35632-0001

Center for Environmental, Energy, And Science Education
Dr. Bernard Benson, Director
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Chattanooga, TN  37403

Center for Geography and Environmental Education
Dr. Rosalyn McKeown-Ice, Director
Claxton Addition 319
The University of Tennessee-Knoxville
Knoxville, TN  37996-3400

Center for Environmental and Conservation Education
Dr. Maurice Field, Director
The University of Tennessee at Martin
210 Frank Clement Hall
Martin, TN  38238

Center for Environmental/Energy Education
Dr. Richard C. Berne, Director
Natural Sciences Building, Room 333-A
Western Carolina University
Cullowhee, NC  28723

Center for Math, Science, and Environmental Education
Mr. Terry Wilson, Director
Mrs. Joan Martin, Assistant Director
179 Jones Jaggers Hall
Western Kentucky University
Bowling Green, KY  42101
APPENDIX B

DIRECTIONS FOR GOALS SURVEY PACKAGE

DEMOGRAPHIC INFORMATION FORMS

GOALS SURVEY - FORM 1

GOALS SURVEY - FORM 2
Although this questionnaire may look complicated, it is relatively simple to complete. Please read the directions carefully before beginning. In the pilot study, the average amount of time needed for completing the questionnaire was 15 minutes.

On the following pages you will find listed a number of goals for environmental education. These goals are presented under five general headings: Awareness, Knowledge, Values, Skills, and Participation.

Four major questions are asked regarding each goal. Please indicate your response by circling the number which corresponds to your opinion concerning each question. The scale should be interpreted as follows:

<table>
<thead>
<tr>
<th></th>
<th>3 - A considerable extent</th>
<th>2 - A moderate extent</th>
<th>1 - No extent</th>
</tr>
</thead>
</table>

**SAMPLE ITEM**

Suppose that the following goal statement was given and responded to with a "3". That would indicate that the respondent felt that the goal was important to the field of environmental education to a considerable extent.

<table>
<thead>
<tr>
<th>GOAL STATEMENT</th>
<th>To what extent do you think this goal should be important to the field of environmental education?</th>
</tr>
</thead>
<tbody>
<tr>
<td>To help students acquire an appreciation for the total environment.</td>
<td>3 2 1</td>
</tr>
</tbody>
</table>

Three of the four questions asked about the goal mentions your "Center". This refers to the university-based Center for Environmental Education that you identified in the demographic information.
ENVIRONMENTAL EDUCATION GOALS SURVEY

Demographic Data

The following information will be helpful in analyzing the data obtained from the attached questionnaire. Please be as complete as possible in your responses. Thanks!

1. State in which you are employed (e.g. KY): ________________
2. Your school district: __________________________ County: ________________
3. University in your region which has a center for environmental education (e.g. Western Carolina University): ________________
4. Age: ___
5. Gender < >: _____ Female _____ Male
6. Grade level(s) that you teach: ________________
7. Subject area(s) that you teach: ________________
8. Years of teaching experience: _____
9. Highest education level (check one):
   _____ Bachelor's Degree
   _____ Master's Degree
   _____ Specialist's Degree
   _____ Doctoral Degree
10. Are you working toward an advanced degree? (Y/N) _____ If yes, check those applicable:
   _____ Master's Degree  Environmental education focus
   _____ Specialist's Degree  other (please specify) _____
   _____ Doctoral Degree

11. Type of classroom setting in which you teach (primarily):
   _____ self-contained classroom
   _____ departmentalized subject area
12. Years you have been teaching environmental education: _____

13. Number and type of inservice training experiences you have had in environmental education:

   ____ summer institutes
   ____ weekend workshops
   ____ school day inservice workshops
   ____ formal courses in environmental education

14. Have you ever conducted/taught inservice programs in environmental education yourself? (Y/N) _____

   If yes, the number of inservices conducted is _____
   and the major program focus (e.g. Project WILD): _____

15. Location of your school: ____ urban ____ suburban ____ rural

16. Size of school population:

   ____ less than 200 students
   ____ between 200 and 500 students
   ____ over 500 students

17. Do you utilize an outdoor classroom/laboratory in your teaching? (Y/N) _____ If yes:

   ____ the area is a part of our school site
   ____ the area is at another school in your district
   ____ other (please explain): ____________________________

18. What university have you received inservice training from in the area of environmental education (e.g. Memphis State University)? ____________________________

THANK YOU! Now please move on to the survey...
<table>
<thead>
<tr>
<th>ENVIRONMENTAL EDUCATION GOALS</th>
<th>To what extent do you think this goal should be important to the field of environmental education?</th>
<th>To what extent do you think the in-service teacher education function of your Center should address this goal?</th>
<th>To what extent do you think the in-service teacher education function of your Center is currently addressing this goal?</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWARENESS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.1 To help students acquire an appreciation for the total environment.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>A.2 To help students develop their ability to perceive the components which make up their environment.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>A.3 To help students develop the ability to process and refine their perceptions in broader environmental contexts.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>A.4 To help students understand the importance of the planet's resources in their everyday lives.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>KNOWLEDGE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K.1 To help students acquire a knowledge of key ecological concepts.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>K.2 To help students acquire an understanding of how people interact with their environment.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>K.3 To help students gain a broader understanding of a wide variety of environmental issues.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>VALUES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.1 To help students acquire a better awareness of their own feelings about the environment.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>V.2 To help students gain a better understanding of the variety of attitudes that other people have about environmental issues.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>V.3 To help students acquire a set of values that reflect a feeling of concern for the environment.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>SKILLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.1 To help students acquire the skills needed to identify environmental problems.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>S.2 To help students acquire the skills needed to investigate environmental issues.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>PARTICIPATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.1 To help students acquire the motivation and commitment to become involved in environmental improvement.</td>
<td>3 2 1</td>
<td>3 2 1</td>
<td>3 2 1</td>
</tr>
<tr>
<td>ENVIRONMENTAL EDUCATION GOALS</td>
<td>To what extent do you think this goal should be important to the field of environmental education?</td>
<td>To what extent do you think this goal should be important to your center?</td>
<td>To what extent do you think the inservice teacher education function of your center should address this goal?</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td><strong>AWARENESS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.1 To help students acquire an appreciation for the total environment.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>A.2 To help students develop their ability to perceive the components which make up their environment.</td>
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</tr>
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<td>A.3 To help students develop the ability to process and refine their perceptions in broader environmental contexts.</td>
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</tr>
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<td>A.4 To help students understand the importance of the planet's resources in their everyday lives.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td><strong>KNOWLEDGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K.1 To help students acquire a knowledge of key ecological concepts.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>K.2 To help students gain a broader understanding of how people interact with their environment.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>K.3 To help students gain a broader understanding of a wide variety of environmental issues.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>K.4 To help gain an understanding of various alternative solutions for solving environmental issues.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td><strong>VALUES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V.1 To help students acquire a better awareness of their own feelings about the environment.</td>
<td>2 2 1</td>
<td>2 2 1</td>
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</tr>
<tr>
<td>V.2 To help students gain a better understanding of the variety of attitudes that other people have about environmental issues.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
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<td>V.3 To help students acquire a set of values that reflect a feeling of concern for the environment.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td><strong>SKILLS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.1 To help students acquire the skills needed to identify environmental problems.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>S.2 To help students acquire the skills needed to investigate environmental issues.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>S.3 To provide students with opportunities to apply skills in investigating and evaluating environmental issues.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td><strong>PARTICIPATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P.1 To help students acquire the motivation and commitment to become involved in environmental improvement.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
<tr>
<td>P.2 To provide students with an opportunity to take citizenship action on one or more environmental issues.</td>
<td>2 2 1</td>
<td>2 2 1</td>
<td>2 2 1</td>
</tr>
</tbody>
</table>
APPENDIX C

TABLES 6-17
Table 6  
Means and Standard Deviations Table: Directors' (N=13) Ratings on the Importance of Goals to the Field of Environmental Education  

<table>
<thead>
<tr>
<th>Environmental Education Goals</th>
<th>Directors Elementary Form</th>
<th>Directors Secondary Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>A.1</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>A.2</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>A.3</td>
<td>2.77</td>
<td>0.44</td>
</tr>
<tr>
<td>A.4</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>K.1</td>
<td>2.70</td>
<td>0.48</td>
</tr>
<tr>
<td>K.2</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>K.3</td>
<td>2.61</td>
<td>0.77</td>
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<tr>
<td>K.4</td>
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<tr>
<td>V.1</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>V.2</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>V.3</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>S.1</td>
<td>2.70</td>
<td>0.48</td>
</tr>
<tr>
<td>S.2</td>
<td>2.69</td>
<td>0.28</td>
</tr>
<tr>
<td>S.3</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>P.1</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>P.2</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 7
Means and Standard Deviations Table: Directors' (N=13) Ratings on the Importance of Goals to the Center

<table>
<thead>
<tr>
<th>Environmental Education Goals</th>
<th>Directors Elementary Form</th>
<th>Directors Secondary Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>A.1</td>
<td>2.77</td>
<td>0.44</td>
</tr>
<tr>
<td>A.2</td>
<td>2.70</td>
<td>0.48</td>
</tr>
<tr>
<td>A.3</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>A.4</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>K.1</td>
<td>2.77</td>
<td>0.44</td>
</tr>
<tr>
<td>K.2</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>K.3</td>
<td>2.77</td>
<td>0.60</td>
</tr>
<tr>
<td>K.4</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>V.1</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>V.2</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>V.3</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>S.1</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>S.2</td>
<td>2.92</td>
<td>0.28</td>
</tr>
<tr>
<td>S.3</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>P.1</td>
<td>3.00</td>
<td>0.00</td>
</tr>
<tr>
<td>P.2</td>
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<td>--</td>
</tr>
</tbody>
</table>
Table 8
Means and Standard Deviations Table: Directors' (N=13) Ratings on the Importance of Goals to the Inservice Teacher Education Function of the Center

<table>
<thead>
<tr>
<th>Environmental Education Goals</th>
<th>Directors Elementary Form</th>
<th>Directors Secondary Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>A.1</td>
<td>2.77</td>
<td>0.44</td>
</tr>
<tr>
<td>A.2</td>
<td>2.69</td>
<td>0.48</td>
</tr>
<tr>
<td>A.3</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>A.4</td>
<td>2.77</td>
<td>0.44</td>
</tr>
<tr>
<td>K.1</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>K.2</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>K.3</td>
<td>2.69</td>
<td>0.63</td>
</tr>
<tr>
<td>K.4</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>V.1</td>
<td>2.69</td>
<td>0.48</td>
</tr>
<tr>
<td>V.2</td>
<td>2.69</td>
<td>0.48</td>
</tr>
<tr>
<td>V.3</td>
<td>2.85</td>
<td>0.38</td>
</tr>
<tr>
<td>S.1</td>
<td>2.69</td>
<td>0.48</td>
</tr>
<tr>
<td>S.2</td>
<td>2.77</td>
<td>0.44</td>
</tr>
<tr>
<td>S.3</td>
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<td>--</td>
</tr>
<tr>
<td>P.1</td>
<td>2.69</td>
<td>0.48</td>
</tr>
<tr>
<td>P.2</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 9
Means and Standard Deviations Table: Directors' (N=13) Ratings of the Extent that Goals are Currently Being Addressed by the Inservice Functions of the Center

<table>
<thead>
<tr>
<th>Environmental Education Goals</th>
<th>Directors Elementary Form</th>
<th>Directors Secondary Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
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<td>A.3</td>
<td>2.00</td>
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<td>A.4</td>
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<td>K.1</td>
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<tr>
<td>K.3</td>
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</tr>
<tr>
<td>K.4</td>
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</tr>
<tr>
<td>V.1</td>
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<td>0.58</td>
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<td>V.2</td>
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<td>S.2</td>
<td>1.85</td>
<td>0.38</td>
</tr>
<tr>
<td>S.3</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>P.1</td>
<td>2.23</td>
<td>0.60</td>
</tr>
<tr>
<td>P.2</td>
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<td>--</td>
</tr>
</tbody>
</table>
Table 10
Means and Standard Deviations Table: Ratings by Teachers from Mature Centers (n=44) and from Young Centers (n=58) on the Importance of Goals to the Field of Environmental Education

<table>
<thead>
<tr>
<th>Environmental Education Goals</th>
<th>Teachers from Mature Centers</th>
<th>Teachers from Young Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>A.1</td>
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<td>0.00</td>
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<tr>
<td>A.2</td>
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<td>0.35</td>
</tr>
<tr>
<td>A.3</td>
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<td>0.39</td>
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<tr>
<td>A.4</td>
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<td>K.1</td>
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<tr>
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<td>0.36</td>
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<tr>
<td>K.3</td>
<td>2.75</td>
<td>0.44</td>
</tr>
<tr>
<td>K.4</td>
<td>2.76</td>
<td>0.44</td>
</tr>
<tr>
<td>V.1</td>
<td>2.64</td>
<td>0.53</td>
</tr>
<tr>
<td>V.2</td>
<td>2.48</td>
<td>0.59</td>
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<tr>
<td>V.3</td>
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<tr>
<td>S.1</td>
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<tr>
<td>S.2</td>
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<td>0.45</td>
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<tr>
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Means and Standard Deviations Table: Ratings by Teachers from Mature Centers (n=44) and from Young Centers (n=58) on the Importance of Goals to the Center

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Table 13
Means and Standard Deviations Table: Ratings by Teachers from Mature Centers (n=44) and from Young Centers (n=58) on the Extent that Goals are Currently Addressed by the Inservice Function of the Center

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Table 16
Means and Standard Deviations Table: Elementary Teachers' (n=54) and Secondary Teachers' (n=48) Ratings on the Importance of Goals to the Inservice Teacher Education Function of the Center

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Table 17
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