AN EVALUATION OF THE CALIFORNIA FORESTRY INSTITUTE FOR TEACHERS

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What a wonderful journey it has been. To those who said it could not be done or that it should not be done, I ask you to think again and dream as I have and take the journey.

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CHAPTER I

INTRODUCTION

Is environmental illiteracy responsible for the destruction of our nations' natural resources? According to the Environmental Protection Agency, two in five Americans live in areas where the air is considered dangerous to breathe. Forty percent of the nations' rivers and lakes are not suitable for human use (drinking, fishing or swimming). In 1993, contaminated water in Milwaukee, Wisconsin was responsible for the deaths of 100 people and contributed to the illness of hundreds of thousands (Browner & Berger, 1995).

What do Americans know about environmental issues? Based on a survey of 1,501 Americans, 83 percent correctly realized that garbage ends up in landfills. Seventy-three percent knew that species loss was primarily due to habitat loss, and 69 percent correctly identified motor vehicles as a primary source of air pollution (National Environmental Education Training Foundation, 1997). However, the report acknowledged that Americans lacked an understanding of other environmental issues. Only 23 percent identified runoff as the leading cause of water pollution while 47 percent believed dumping of waste by factories to be the major cause of water pollution. Thirty-three percent recognized burning fossil fuels were the primary method for generating electricity and understood the impact it had on the quality of air (NEETF, 1997). Overall, the survey indicated that two out of three Americans scored less than 70 percent on knowledge questions associated with human impact on the environment. The report indicated that 95 percent of Americans support environmental education in schools (NEETF, 1997).

Agriculture vs. the Environment

Competition for resources such as land, and water between farmer and homeowners/industry has resulted in land-use confrontations (Browner & Berger, 1995). Today, more Americans have an understanding that to ensure a good quality of life for themselves as well as their children, they must act responsibly. They must undertake the role of stewards of our air, water, and land resources to ensure that it will be available for the next generation (Browner & Berger, 1995).

One of the many challenges facing American agriculture has been the pressure of urbanization of rural areas surrounding expanding towns and cities (National Research Council, 1988). When the natural boundaries separating urban activity from rural production areas diminish, and competition for scarce resources such as land and water increases, confrontations occur. According to Tomaka (1998), over two hundred million acres of farmland in the U.S. has disappeared since 1955 due to urbanization. If current trends persist, the United States could become a net food importer rather than a net food exporter in the next century (Tomaka, 1998).

Agriculture (including the forest timber industry) has received its fair share of criticism over varied production practices, which have been blamed for a decline in environmental quality (Brown, 1987; Peterson, 1998; Hinnefeld, 1999; Minnesota Legislative Reference Library, 1999). As the use of natural resources rapidly escalates, environmental quality declines (Brown, 1987). Such activities are associated with intensive crop cultivation procedures, large-scale livestock confinement operations, and timber management practices. Traditional agricultural and forestry practices, which have been successful in providing food, fiber, and building materials for a growing urban population, are called into question when competition for land and water are at stake. Due to increased efficiency of production agriculture, a once labor-intensive industry has transformed into heavily mechanized operations. Fewer persons are required to produce and meet the challenge of an ever-growing demand for food and fiber today than were required many years ago (Birkenholz, 1990). Subsequently, the general populace has become less literate to the source and methods utilized to produce their food (National Research Council, 1988). Compounding the problem is the impact that an increasing human population has on the demand for food, fiber and raw materials. This impact has had an effect on the quality of soil, water, and air resources.

Agricultural Education and Environmental Education

Is there a common thread shared between environmental education and agricultural education? The science of agriculture involves the interaction of humans with the environment to produce food and fiber. This interaction is complex, as humans have developed a dependency on environmental resources for daily needs. As the global population continues to increase, a greater level of interaction and dependency occurs. Technology and economic forces dealing with these pressures have resulted in a decline in the number of farms nationwide. According to the National Research Council (1988), the number of farms in the U.S. declined from 6.3 million in the 1930s to about 2.3 million in 1988. The number of farmers in the U.S. had declined as well. From 30 percent of the population in 1920, to 2.2 percent in 1985 (NRC, 1988). Land once dedicated to the management of resources and cultivation of food and fiber is disappearing under the pressure of sprawling urbanization. According to an Associated Press article in the December 18, 1991 issue of the Statesman Journal, from 1970 to 1990 more than 30,000 square miles (19 million acres) of once-rural lands in the United States became urban, as classified by the U.S. Census Bureau. The effect of increasing population on limited land space and water supplies, along with decreasing amounts of our nations forested lands due to conversion to cropland, urban development, and damage by acid rain threaten the quality of life (Randall, 1981).

Rachel Carson's *Silent Spring* (1962) was a description of the reduction in numbers of wildlife as a result of chemical pollution of the environment by human activity. This novel is credited for triggering a worldwide reaction. A movement towards creating an awareness of the human impact on global resources came to the attention of our society during the 1970's. A definition of environmental education emerged from the UNESCO Conference in Tbilisi, Georgia, the former USSR in 1977:

> Environmental education is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and prevention of new ones (p.7)

Environmental Education in the United States

Environmental education has traditionally been approached as a topic of professional development; material to be infused into existing curricula. In 1994, a model for aiding states to achieve an environmentally literate population was created. The model identified sixteen program, structure, and funding components for what was defined as a "comprehensive environmental education program" (Ruskey & Wilke, 1994). In 1997, a study of the status of comprehensive state-level environmental education programs in the United States was conducted (Kirk, Wilke, and Ruskey, 1997). Twelve states reported having from eight to twelve components in place. Thirty-two states reported as in the process of implementing one component of a comprehensive program. Thirteen states indicated having state master plans for environmental education. Only the state of Wisconsin has mandated environmental education competencies as a prerequisite for teacher licensing. Kirk, Wilke and Ruskey (1997) concede the variability and diversity of state education programs will impact the level and rate of adoption and implementation of environmental education programs.

Can teachers affect the environmental attitude of students? To understand this concept, we must have an understanding of environmental attitude. According to Fishbein and Ajzen (1975), attitude is defined as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (p.6). The investigators further break this definition into three components: attitude is learned; it predisposes action; and such action or behavior is consistent with the attitude expressed. Pelstring (1997) provides a definition of "environmental attitude" as "a learned predisposition to respond consistently favorable or unfavorable manner with respect" to the environment.

The emphasis of the movement to heighten the awareness of the population has been towards the education of elementary and high school students through the transfer of information from teacher to pupil through professional development activities.

Workshops have been developed which focus on the integration of environmental education topics into the elementary and high school classroom. Two such programs that have emerged are Project WILD and Project Learning Tree. Project WILD is an interdisciplinary environmental education program that allows teachers to utilize their subject areas to teach environmental concern, awareness and concepts to students (Project WILD, 1986). Project Learning Tree is an environmental education program focusing on the interdependence of society and nature with the forest as the primary basis from which instructional ideas and activities are developed (Hamilton, 1982). These programs are examples of award-winning environmental education curriculum programs offered throughout the nation designed to teach teachers how to integrate environmental education topics into existing class curriculum (Project WILD, 1986).

Environmental Education in California

With more than one third of the land base of the state of California in forestland, and nearly 37 million acres of California forests in private and public ownership, the average Californian consumes the equivalent of a 100-foot tree per year (California Forest Products Commission, 1999). Should there be a greater emphasis on the integration of environmental education into existing California public classroom curriculum? By the year 2020, it is estimated that the demand for wood products will increase by 50 percent (California Forest Products Commission, 1999). The competition for land to grow forest products has come from expanding residential home construction and the agricultural industry. The human impact and dependency on California forests raised many issues regarding its use and management. Dr. Thomas Bonnicksen (1997) of

Texas A& M University summarized the question of human management of the forests in California with the following statement:

> The future of the ancient forests in the Sierra Nevada is in doubt. A dangerous myth is guiding us toward an ecological future that will harm the flora, fauna and people of the Sierra. Flawed reasoning and an ignorance of history and ecology have led some people to believe that humans are not part of nature. Ironically, excluding people from nature is an unnatural change that ultimately will destroy the ecological communities that environmentalists wish to preserve (p. 14)

Purpose of the Forestry Institute for Teachers (FIT)

To aid teachers in the integration of environmental education and natural resource management curriculum into their existing classrooms, the University of California Cooperative Extension, Shasta County Department of Education, the Northern California Chapter of Society of American Foresters and private timber industry developed the Forestry Institute for Teachers (FIT). Since 1993, the California-based forestry & environmental education institute has provided K-12 California teachers with the knowledge, tools, and skills to effectively teach their students about forest ecology and forest resource management practices.

The purpose of the Institute was to help teachers integrate environmental education materials into their existing class curriculum. The weeklong intensive training provides K-12 teachers (including agriculture instructors), an overview of forest ecology and natural resource management and its impact on society. Teachers received sixty hours of training and were expected to complete a curriculum unit demonstrating the integration of environmental education topics into their curricula.

There are a number of programs, which teach teachers how to use environmental education topics in their own classroom. Such programs include Project WILD, Project

WET and Project Learning Tree (PLT). In California, the Forestry Institute for Teachers (FIT) is a literacy project that introduces teachers to environmental education curriculum materials such as Project WILD, Project WET and Project Learning Tree. The Forestry Institute for Teachers (FIT) strives to incorporate natural resources and environmental education concepts into K-12 classrooms. The seminar was developed to provide all teacher-participants an opportunity to take part in experiential learning activities designed to teach teachers how to integrate specific concepts into a broad range of curricula. Teachers were taught how to develop a curriculum project utilizing units from many of the suggested sources. Program graduates were requested to submit a curriculum unit they have developed from materials and activities obtained from the workshop and incorporate into lessons with their students.

Little evaluation of the effectiveness of environmental education programs exist (Hendee, 1972; Lucko, Disinger & Roth, 1982; Moseley, 1993). A survey performed by Lucko, Disinger, and Roth (1982) of 284 environmental education programs revealed only seven percent included formal evaluation. When evaluating the use of outdoor demonstration programs, research on the evaluation of educational effectiveness is rare (Harmon & Jones, 1997).

Since the inception of the Forestry Institute for Teachers (FIT) in 1993, pre/post test knowledge assessment of workshop participants and submission of curriculum units developed by teachers have been used to evaluate the workshop. No formal evaluation has taken place.

Statement of the Problem

How have teachers that completed a Forestry Institute for Teachers (FIT) forest ecology workshop implemented environmental education materials into their classroom teaching?

Purpose of the Study

The purpose of this study was to evaluate the impact of the Forestry Institute for Teachers (FIT) weeklong resident summer workshop on the integration of environmental education materials in K-12 teacher classrooms and environmental knowledge and attitudes of selected teachers and their students.

Objectives

The objectives of this study were:

1. To develop a profile of Forestry Institute for Teachers (FIT) participants.
2. To determine frequency of and method of use of environmental education materials provided to teachers by FIT.
3. To determine if perceived barriers exist which prevent teachers from integrating environmental education topics into the curriculum.
4. To identify areas for improving the FIT program
5. To determine what impact FIT had on the environmental knowledge and attitudes of agricultural education teachers who completed FIT and their students when compared to a similar group with no FIT experience.

6. To determine if relationships exist between and among personal of teachers and students concerning environmental literacy.

Rationale for the Study

Educational evaluation is the process of determining the value of educational programs, materials and techniques (Borg & Gall, 1983). Program administrators have viewed evaluations as a necessary tool to make decisions about program success, management and in policy analysis. According to Wiersma (1995), a function of evaluation is to assess the merits of a program in a specific situation. The results of an evaluation aid in decision making which affect the design, content, management and direction of the program. Since the inception of the Forestry Institute for Teachers in 1993, no formal evaluation of the workshop, beyond pre/post test knowledge assessment of workshop participants has occurred. Additionally, no study has been conducted to determine the effects of a workshop on the transfer of environmental knowledge and attitudes from teachers to students. This study was developed to evaluate California' Forestry Institute for Teachers professional development program and to promote a basis for recommendations for future programming.

Definition of Terms

Environmental Education – refers to "the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among humans, their culture and biophysical surroundings. Environmental Education also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality" (Stapp, 1967)

Environmental Literacy – refers to the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems (Disinger & Roth, 1992). In terms of observable behaviors, the definition people who are environmentally literate have the capacity to demonstrate what they have learned in terms of key concepts, skills acquired, and disposition toward issues (Roth, 1992).

Forestry Institute for Teachers (FIT) - refers to a special forest ecology and natural resource / environmental education workshop. A collaborative professional development workshop jointly sponsored by the Northern California chapter of the Society of American Foresters, Shasta County Department of Education, and private industry.

Knowledge - Roth (1979) defined knowledge as a familiarity, awareness, or understanding of the environment through experience or study. For this investigation, it is specifically defined as the mean score on the fifteen-item Knowledge subscale of the Environmental Student Survey, developed by the author.

Attitudes - As defined by Knapp (1972) it is the predisposition of an individual to evaluate some psychological object in a favorable or unfavorable manner. Specifically, ii is defined as the mean value on the twenty-seven-item Attitude subscale of the Environmental Student Survey, developed by the author.

Project WILD – refers to Wildlife In Learning Design; an interdisciplinary environmental education program which allows educators to use their subject specialty area to teach environmental concern, awareness, and concepts to students (Project WILD, 1986).

Project Learning Tree (PLT) – refers to the interdisciplinary environmental education program for educators that helps students gain awareness and knowledge of the natural and built environment, their place within it, as well as their responsibility for it.

Locations – refers to any of the four workshop sites located in northern California where Project FIT workshops were conducted during the summer months from 1992 to 1999.

Completer – refers to a program graduate who attended a weeklong workshop and submitted a curriculum unit to the administrative staff of Project FIT.

Pre-Service Training – teacher-training that occurs in colleges and universities before students are certified or licensed to teach.

In-Service Training or Professional Development – training of teachers which takes place after teachers are in the classroom; may be in workshop settings, or in after-school meetings.

Scope

The scope of the study included K-12 educators (including agricultural teachers) from throughout California who attended a weeklong Forestry Institute for Teachers summer resident workshop during the six-year period of 1993 through the summer of

1999 and secondary agricultural education students of agricultural education teachers who completed a FIT workshop.

Expected Results

This study was conducted to provide the staff of the Forestry Institute for Teachers and their sponsors with data that illustrate frequency of use of materials, levels of implementation, and perceived barriers to implementation. Results of this study can be used to determine if the Project FIT program needs to make improvements in the structure of the program or if additional training of teachers is necessary.

Implications

Little research exists on the environmental knowledge and attitudes of high school agriculture students in California. This study will serve to establish a baseline for future studies.

If significant differences do exist between the student groups, perhaps a rationale exists for proposing to the Agricultural Education Unit of the California Department of Education that a Forestry Institute for Teachers summer resident workshop be considered as professional development activity for all California secondary agricultural education instructors. A workshop specifically designed to assist agriculture educators in the integration of environmental education activities into their existing curriculum will prepare teachers to meet the new challenges of the twenty-first century and address the recommendations of the National Research Council.

The researcher is well suited to conduct this study because of his background having graduated from a FIT workshop and having served as a secondary agricultural education teacher in California for thirteen years.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to evaluate the effectiveness of the Forestry Institute for Teachers environmental education program in providing teachers with skills and knowledge to effectively teach their students about forest ecology and forest resource management practices. The ability of the Institute to achieve this goal is largely accomplished through in-service education strategies with the intent that teachers will adopt and integrate the new materials into their classrooms. This study of the Forestry Institute for Teachers consequently draws upon several fields of literature. A presentation of the research covers the following areas: (1) history of environmental education, (2) environmental literacy, (3) in-service education and staff development, (4) curriculum adoption and implementation, (5) barriers to adoption and integration of new curriculum themes, (6) linking agricultural education to environmental education, and (7) knowledge and attitude assessment.

The database for this study has come from searches in the ERIC computerized data files, unpublished thesis in the Oklahoma State University Library collection, and Dissertation Abstracts International. In addition, a manual search of curriculum journals was performed. Sources from these searches and additional materials previously identified were then utilized to locate other documents.

History of Environmental Education

The literature suggests the words of early 17th Century scholar John Amos Comenius paint a picture of the philosophy of environmental education (Fridley & DeLong, 1999). Comenius believed instruction began with actual inspection of objects not with verbal description of things. He indicated the object must be a real, useful thing, capable of making an impression upon the senses (Fridley & DeLong, 1999). Comenius refers to the use of all bodily senses to invoke learning through self-discovery.

Jean Jacques Rousseau in the 18th Century favored discovery of information and applying processes over the memorization of facts and learning by rote. In his words, "Our first teachers are our feet, our hands, and our eyes. To substitute books for all these…is but to teach us to use the reason of others". A return to nature was his dictum (Fridley & DeLong, 1999).

John Heinrich Pestalozzi believed in discussion over recitation. He favored individual learning with group discussion, and for teaching students to think for themselves. Developing ones inborn oral, social and intellectual capacities through gardening, nature study, and play was the belief of Friedrich Froebel (Fridley & DeLong, 1999).

Each of these early educational philosophers draws upon the experiential learning experiences in the outdoors as an appropriate method of learning, that the environment is the classroom for learning. Wilbur Jackman's *Nature Study for Common Schools* (1891) is considered the first attempt to introduce the nature study movement into formal education. He has been credited with setting forth some early ideas that are still important today in elementary science education: inquiry and discovery with first hand observation experience (Swan, 1975).

A scientist by the name of Ellen Swallow Richards coined the term ecology in 1872, and in 1907 Gifford Pinchot, chief of the U.S Forest Service, introduced the world to the term conservation. Pinchot believed that resources such as forests needed to be managed to achieve the greatest good for the greatest number of people, while John Muir, founder of the Sierra Club maintained that forests should be set aside in national parks to be preserved. (Fridley & DeLong, 1999; USDA Forest Service, 1999).

During this time, agricultural education gained a national focus. The Morrill Act of 1862 resulted in the establishment of land-grant colleges to provide instruction in agricultural sciences to the common man, and the Smith-Hughes Act of 1917 provided federal financing for vocational agricultural education at the secondary school level (NRC, 1988). Many of the education efforts of the era were directed toward the emerging conservation issues, with hands-on training and practical applications.

In the present, the delivery of environmental education programs in K-12 education takes the form of two approaches, with school systems adopting some combination of the two. The most prevalent form in both elementary and secondary education is toward an approach known as "infusion, the integration of environmental education topics into the existing classroom curriculum. The folding of material into lessons, units, or topics focusing on the core subject such as agriculture, history, science, or social studies (NEEAC, 1996). From the pages of *Focus on Forests* a Project Learning Tree activity guide published by the American Forest Foundation (1995), a student activity page details the state park reclamation project of the Raton, New Mexico FFA

Chapter. The student activity page part of an environmental education lesson titled "Take Action!" presented an example of how the interaction of agriculture education and environmental education are linked to one another.

The second form of delivery is referred to as the "second-course" or "block" approach (NEEAC, 1996). Essentially, a separate and distinct environmental course is developed and delivered. Proponents for this method argue that the separate course offers depth (which lacks with an infusion model), as well as a focus for attracting funding, evaluating progress, and encouraging career development (NEEAC, 1996).

The research finds that most states utilize the infusion method as the approach for integrating environmental education into the curriculum (NEEAC, 1996).

The Committee on Agricultural Education (NRC, 1988) has recommended curriculum reform efforts in the field of agriculture education. An example is through the teaching of biology through agriculture science. Appropriate topics include ecological relationships and environmental problems (NRC, 1988)

The concept of using the environment to reinforce concepts in academic subject matter such as science can be traced back to the 1800s. Hillison (1997) reported that prior to a movement to integrate agricultural themes into academics, a nature-study movement emerged to bring reality into the study of science in elementary school classrooms. Agriculture education moved toward teaching the science and method of production agriculture practices.

Environmental education is related to terms such as conservation education, nature study and outdoor education and although some educators believe these terms describe the same process, there exists significant differences between them (NEEAC, 1996).

A 1994 study of federal and state education agencies, local school districts, universities and environmental organizations revealed a broad-scale need for better information about strategies that are working to integrate environmental content, pedagogy and principles into formal K-12 educational systems. This study found that environmental education had achieved only minor integration in systemic education reform efforts (Lieberman, 1995). According to NEEAC (1976) environmental education is relevant to all citizens as it can ensure the health and well being by protecting human health, providing career opportunities, promote sustainable development, advance quality education and protect our nation's natural heritage (NEEAC, 1996). Many goals of educational reform movements can be accomplished through environmental education (NEEAC, 1996). The report suggested that environmental education provided the opportunity to strengthen teaching in many academic areas as science due to its foundation for solving environmental challenges.

A federal interagency report on environmental education and training included the following regarding the benefits of integrating environmental education into class curriculum:

> "... infusing environmental education into all subject areas can lead to overall improvements in the educational system, including improvements in teaching the core subjects." (FCCSET , 1993).

Environmental Literacy

Disinger and Roth (1992) reported the bottom-line goal of environmental education is the "creation of an environmentally literate citizenry." This would be accomplished by increasing the number of individuals who "achieve a high degree of competency on the environmental literacy continuum." Ruskey (1995) listed the key traits of an environmentally literate citizenry as those persons which posses an awareness and appreciation of natural and built environment; knowledge of natural systems and ecological concepts. An understanding of the range of current environmental issues as well as the ability to use investigative, critical-thinking and the problem-solving skills toward the resolution of environmental issues are characteristics of the environmentally literate individual (Ruskey, 1995)

The National Environmental Education Act (Public law 101-619) of 1990 refocused the attention of educators to Environmental Education. Little attention was focused to the Environmental Education Act of 1970 housed in the US Department of Health, Education, and Welfare. Conservationists and environmentalists viewed education as the vehicle for promoting environmental quality (NEEAC, 1996). A survey of more than 2000 science and social studies educators and nonformal educators working in aquariums, museums, nature centers, and zoos found that over 90 percent indicated that environmental education should be priority in schools and nonformal institutions (WWF, 1993). Further, the survey found educators stressed a need for more materials, training, and institutional commitment for environmental education (WWF, 1993)

Disinger (1987) noted that elementary schools implemented more traditional forms of environmental education (nature study, outdoor education, and conservation education) than secondary schools. State requirements for inclusion of environmental education vary (Disinger, 1987). Pennsylvania requires on environmental education course of all high school students (Disinger, 1978). Indiana, New York and Washington mandated the availability of environmental courses as electives in secondary schools. On a nationwide level, across the board for K-12, energy education appeared to be the most commonly employed approach to environmental education (Disinger, 1987).

According to Wilke (1995), Agenda 21, a blueprint for action adopted by the leaders attending the 1992 United Nations Earth Summit, called for aggressive measures to strengthen the environmental education received by the worlds citizens. According to this document, colleges and universities have been challenged to increase their role in developing an environmentally literate citizenry (Wilke, 1995)

One university has taken environmental literacy a further step in the preparation of its graduates. University of Wisconsin - Stevens Point task force identified environmental literacy as one of fourteen competencies to be expected of all University of Wisconsin-Stevens Point graduates (Wilke, 1995). Environmental literacy may be more common place in the academic core curriculum. A report to Congress prepared by the National Environmental Education Advisory Council (1996) included a summation of a report on environmental education and training that concluded:

> "..infusing environmental education into all subject areas can lead to overall improvements in the educational system, including improvements in teaching the core subjects" (p.6)

An interview with a representative of the California Department of Education summarized the following about the teaching of environmental education in California schools:

> "Environmental education is required, by the State Education Code, in all appropriate grade levels and subject matter fields, with emphasis in the areas of science and social studies.....The state Science Framework Addendum and other recommended publications emphasize environmental concepts. The state testing program includes questions relating to EE, and local agencies structure programs to conform to this program.....There is pressure from the state level to teach appropriate EE concepts as a part of the K-12 instructional program..." (Disinger,1987)

What role should environmental education play in teacher education? Wilke (1985) reported that Wisconsin agriculture teachers as well as other science and elementary teachers were required to achieve specific competencies in environmental education as a requirement to obtaining a teaching license. In 1995, it was reported that the states of Arizona and Delaware joined Wisconsin in requiring environmental education training prior to teacher certification or licensing (NEEAP, 1999).

According to Jaus (1978), two major goals of environmental education are to develop a student' attitude toward the environment and to transmit environmental knowledge to students. A first logical step toward achieving these goals is to produce teachers who are willing to teach and are competent in environmental education in the classroom (Jaus, 1978). One way to produce such teachers is to train them in both environmental content and the methodology of teaching environmental education (Jaus, 1978).

The international community recognized the need for environmental education at the United Nations Conference on the Human Environment held in Stockholm in June 1972. Conference participants recommended that:

> The organizations of the United nations system, especially the United Nations Educational, Scientific, and Cultural organization, and other international agencies concerned, should after consultation and agreement, take the necessary steps to establish an international programme in environmental education, interdisciplinary in approach, in school and out of school, encompassing all levels of education and directed towards the general public, in particular the ordinary citizen living in rural and urban areas, youth and adult alike, with a view to educating him as to a the simple steps he might take, within his means, to manage and control his environment (p.19).

UNESCO's implementation of the above recommended program led to the Tbilisi Intergovernmental Conference in October 1977 (UNESCO, 1978). The Tbilisi Declaration, issued by this conference, declared that environmental education, utilizing findings of science and technology, should play the leading role in creating environmental awareness, fostering positive national patterns of resource use, and providing education for citizens of all ages (Ramsey, 1979). The Tbilisi Conference regards Environmental Education as:

> … a process during which individuals and the community are made aware of their environment and of the interaction of its biological, physical and socio-cultural components, and acquire the knowledge, values, skills, experience and the will enabling them to act, individually and collectively, so as to solve the present and future problems of the environment. (UNESCO, 1980, p.31)

The objectives of environmental education summarized in The Belgrade Charter were six items: awareness, knowledge, attitude, skills, evaluation ability, and participation (UNESCO, 1977). The Tbilisi Conference endorsed the following five categories of objectives for environmental education:

> Awareness: an awareness and sensitivity to the total environment.
> Knowledge: a variety of experiences in and a basic understanding of environmental problems.

> Attitudes: a set of environment values and a felling of concern for the environment, and the motivation for actively participating in environmental improvement and protection.
> Skills: skills for identifying and solving environmental problems.
> Participation: taking thoughtful positive actions toward the resolution of environmental issues and problems. (UNESCO, 1980, p.71)

Lane, Wilke, Champeau, and Sivek (1995) explored strengths and weaknesses of teacher environmental education preparation in Wisconsin. With a sample of 1545 teachers, they found that for each of the areas studied (perceived competencies, attitudes, and class time), the mean responses of teachers who had received environmental education preparation were consistently more positive than the mean responses of teachers who lacked this experience.

Curriculum Adoption and Implementation

For a workshop to be successful in having teachers adopt a new curriculum or infuse a component requires the ability to overcome the challenges associated with curriculum adoption. An important factor in the adoption of curriculum is teacher attitude and characteristics (Conroy, 1999) as well as the knowledge level and understanding of the prospective user toward the curriculum material. Two types of observable behaviors associated with curricular change are direct classroom behavior and the preparation and planning of teaching (Fullan, 1987). The literature asserts that the attitude of the adopter of an innovation is linked to the commitment the user makes toward specific curriculum elements (Fullan, 1991). According to Fullan (1991) the biggest determinant of success or failure of the adoption of a curricular innovation is commitment. The adoption of a curriculum innovation occurs in stages. The primary stage is recognition and acceptance of the need for the change. Unless the need is clearly justified, and that specific problems can be visually or conceptually realized, adoption of curricular revision is delayed (Fullan, 1991).

The second stage of the adoption process is analyzing the environment in which the change is to occur. In this case, principle groups involved with the development of the curriculum, the barriers to adoption or implementation of the change, and institutional structures to be considered (Fullan, 1991).

A third stage is to recognize the need for alternative plans of action (Darrow and Henderson, 1987). Christiansen and Taylor (1966, as cited by Conroy, 1999) conceptualized that curriculum implementation process is most successful when individual teacher characteristics, their value system and awareness of the processes are taken into consideration by those encouraging the adoption and implementation of the curriculum. Teachers with similar characteristics, background, education, teaching other teachers facilitates the process. Conroy (1999) implied that curriculum adoption requires teachers to understand that a need exists for the innovation as well as a commitment to the implementation.

Ruskey (1995) found that most states with environmental education legislation had curriculum requirements or recommendations, but these were non-binding with the school districts. Without a K-12 curriculum planning requirement, teacher training, and other components to back curriculum initiatives, they had little impact. It was noted that most states use curriculum guidelines and curriculum guides to infuse environmental education content into school subjects. No state had a complete program of study in environmental education for grades K-12 supported by environmental education guidelines or outcome, and state-specific curriculum guides (Ruskey, 1995).

In-service Education and Staff Development

In his 1995 study of state profiles in environmental education, Ruskey found that the majority of states did not provide instruction in environmental education for teacher candidates or pre-service teachers. Only three states were identified with pre-service environmental education teacher training requirements: Arizona, Maryland and Wisconsin (Ruskey, 1995; NEEAC, 1996).

To provide teachers with a background in environmental education, an alternative method of conveying the knowledge and skills would have to occur. Until teacher-preparation units of universities adopt a framework for infusing environmental education into ore-service education, teachers would have to rely on professional development activities to receive the material and experiences (Stapp, 1964). In-service education and staff development-service training for many K-12 teachers is one of the most important aspects to the successful implementation of environmental education concepts (Stapp, 1964). Much of the in-service training takes place through workshops at national, regional, or state environmental education conferences, or in conjunction with partners such as zoos, museums, or science centers (NEEAC, 1996). Non-profit education organizations such as Project Learning Tree, Project WET, Project WILD, and World Resources Institute conduct specialized workshops and often provide continuing education units or specific college credits for teachers who require professional development credit to maintain their certification (NEEAC, 1996)

Two important themes surfaced in the literature as key strategies for implementation of curricular innovations: in-service education and professional development (NRC, 1996; Conroy, 1999). Key points that were stressed included the need for continuous programs, the need for teachers as trainers, and importance of feedback (NRC, 1996). The use of professional development and in-service education as a vehicle for teaching educators the knowledge and skills to provide instruction in environmental education is a wide practice.

During the summers of 1970 and 1971, the Science Teaching Center of Indiana State University sponsored a three-week outdoor science education workshop for K-12 teachers (Parks, 1972). The format was a cross-disciplinary informal approach, which was inquiry-oriented. Participants completed science activities in the outdoors designed to be adaptable to their own individual instructional programs. The fifteen-day length provided time for morning instruction as well as a combination of field and laboratory experiences (Parks, 1972).

The emphasis of a Florida teachers-training-teachers program was to create interest, understanding and sensitivity about the environment, and to develop skills necessary to teach and motivate students toward responsible social and political action (Tillis & LeHart, 1974) By utilizing teachers as workshop leaders, a multiplying effect would soon follow. The plan called for a sequence of developing awareness, sensitivity and understanding and to motivate for social action. Participating teachers were provided with methods to plan, facilitate and evaluate their own workshops. Reported advantages to this type of training program were cost efficiency, speed, and effectiveness in establishing contact with a large group of teachers in a short period of time (Tillis & Lehart, 1974)

A four-phase program was established whereby a state level meeting with an attendance of 130 teachers served as a train the trainers' session. Seven regional level workshops and thirty-five district level workshops would follow. It was estimated that a total of 350 local school-site workshops would be conducted. Approximate attendance would equate to 35,000. Local resources and addressing the needs of the community were the focus. The workshop reportedly produced teachers with an awareness and understanding of the environment and equipped them with techniques to assist others in learning about the environmental program (Tillis & LeHart, 1974).

Hounshell and Liggett (1976) reported on a model inservice education program in North Carolina for teachers that was effective in bringing about change in their students. According to the Hounshell and Liggett (1976) the purpose of all activity of the Environmental Education Center was to bring about cognitive and affective change in students by bringing about cognitive and affective change in their instructors. Participating teachers were pre-tested on the first day of a weeklong workshop and post-tested on the last day of the program or approximately two months later. Students of teachers were pre-tested on the first day of teachers' return and post-tested at the end of the school year. Findings revealed that student learning were influenced by "treatment" of the teachers through in-service education (Hounshell & Liggett, 1976).

Ruskey (1995) reported that teacher training in programs in environmental education is available in all fifty states. Most are informal and coordination between training programs is non-existent. A low priority is given by state education agencies to provide environmental education in-service training (Ruskey, 1995). According to a 1994 study by the National Consortium of Environmental Education and Training:

> "State natural resource agencies, colleges and universities, nonprofit organizations, and school districts all rate higher than state education agencies as providers of environmental education in-service training… the goal of infusing EE into school curricula would benefit from being supported, or even better, championed by state education agencies."

Bessire's (1992) study examined secondary agriculture teachers teaching of natural resource management. He found that eighty-two percent of Oklahoma agricultural education teachers who had special training in natural resources specified that summer in-service was the type of special training received (Bessire, 1992).

Barriers to Implementation

Acceptance of an idea and innovations are precursors to change while human resistance to ideas are barriers to change (Darrow & Henderson, 1987). Research has found barriers to fall into four broad categories; conceptual, logistical, educational and attitudinal (Sewing, 1986). In terms of environmental education, a conceptual barrier is identified as a lack of consensus about the scope and content of environmental education, that it is related only to science curricula and does not cross-over to other academic disciplines such language arts, or social studies (Ham andSewing, 1986). The thought was that environmental education was an outdoor discipline and to be considered as a separate curriculum competing for time dedicated to existing class instruction. Logistical barriers include perceived lack of time, funding, teaching materials, and appropriate class sizes (Ham and Sewing, 1986)

The lack of teacher competence from the perspective of the instructor is a condition of an education barrier. Instructor's attitude about science and the teaching of environmental education is the basis for the fourth barrier category, attitudinal (Ham and Sewing, 1986). Previous research indicates that logistical barriers are most critical for adoption of new curriculums (Conroy & Walker, 1999; Ham, Rellergert-Taylor & Krumpe, 1988). Simmons (1998) identified six factors in an analysis of benefits and barriers to utilizing certain locations for environmental education learning sites: appropriateness of teaching setting, confidence of instructor, need for training, hazards, worries, and difficulty of teaching environmental education.

Urban nature settings when compared to other sites obtained the least favorable rating by teachers as an appropriate location for environmental education instruction. Natural settings identified as deep woods and rivers were identified as more appropriate locations for teaching the subject matter than urban nature areas, however, a high concern for hazards surfaced in the data (Simmons, 1998).

Barriers to Agricultural Education

Research offers the following reasons for agricultural teachers' difficulty in adopting natural resource education topics into the existing agriculture curriculum. Tulloch (1975) reported the following: (1) not enough students enrolled to justify the offering of a specialized course, (2) too many students to handle in a new offering, (3) a lack of time to adequately develop new curriculum, (4) lack of financial support and/or resources to establish the new curriculum, and (5) a lack of personal knowledge, background, or experience.

Conroys' (1999) study of the adoption of a curriculum innovation by agriculture teachers found that despite perceived barriers of lack of curriculum materials, cost, and time commitments, if teachers were convinced the implementation would assist students in learning, the barriers could be overcome. Having barriers to adoption does not necessarily result in non-adoption (Conroy, 1999). An in-service workshop designed and implemented to reduce barriers that prohibit teachers from conducting environmental education activities was successful in reducing a portion but not all barriers that existed as perceived by workshop participants (Ham, Rellergert-Taylor, and Krump, 1988).

Ham & Sewing (1988) reported the ranked barriers of environmental education to elementary teachers. Sixty-four percent of those categorized where logistical in nature. Twenty-one percent fell into the educational category and seven percent were identifiable with attitudinal. Perceived barriers to inflexible state curriculum requirements, restrictive environmental regulations limited student interest limited administrative support, limited occupational opportunities (Conroy & Walker, 1999). The use of teacher in-service training to provide educators with instructional materials, activity guides and experiential learning experiences responded to the belief that a major barrier to using environmental education in the classroom were from a lack of teaching materials and hands-on training activities (Ham, Rellergert-Taylor & Krumpe, 1988)

Environmental education has had an impact on agricultural education instructors obtaining their teaching credentials. According to a state mandate, all teachers certified in the State of Wisconsin after 1985 must have received instruction in seven environmental competencies (Engleson, 1985). According to State of Wisconsin Statutes (Section 121.02[1]) all school districts were mandated to have developed a *written, sequential* *curriculum* in Environmental Education. Since 1985 two other states have joined Wisconsin in mandating the passage of environmental competencies prior to teacher licensing (Engleson, 1985).

Pettus (1974) concluded that teachers differed in their attitudes toward environmental issues based upon their age, number of years teaching, whether or not they have participated in an environmental education course or workshop, college major and teaching area. However, teachers did not differ in their attitudes toward environmental issues based on grade level at which they teach. Based on the Environmental Attitude Inventory, teachers differed in attitude toward certain issues based upon the gender, family supporters job type, and childhood community type and present community type. Study needed concerning effects of differences in gender, SEC background, and community type for more conclusive evidence (Pettus, 1974).

Linkages to Agricultural Education

Agricultural education and environmental education share very closely related themes. According to Vahoviak and Etling (1994), both disciplines represent a potential coalition from which a foundation for the development of ecological literacy education can begin. The application of environmental education activities in agricultural education is evident in many activities. Leadership, mechanics, land labs & trails, greenhouses, simulations, natural history, FFA Career Development Events, and sustainable agriculture are agricultural education activities with very close ties to environmental education (Vahoviak & Etling, 1994). The existence of a healthy and prosperous agriculture industry is dependent upon an environment strong enough to absorb the impact and the ability to recover from extended and increasing usage.

Management of natural resources has been a part of the agricultural education curriculum in secondary schools since federally supported vocational agriculture education was created in 1917 (Williams & Wise, 1997). However, natural resource curriculum and forestry management topics were traditionally offered by secondary programs located in geographical areas adjacent to or surrounded by areas where the subjects were most appropriate. The needs of the community and career opportunities often dictated the curriculum content as it related to the local agriculture program. Up until 1975, many teachers in the agricultural education profession did not have a background in natural resource education (Tulloch, 1975).

Kirts (1990) reported that both agricultural education and environmental education encompass natural resource management as a common subject. However, both tend to exist in separate worlds. The goals of each discipline include the teaching of problem solving, decision making, citizenship and student projects (Kirts, 1990). According to Kirts (1990), teacher educators and other professionals associated with agricultural and environmental education should establish program linkages which facilitate instruction about natural resources.

A subject area of an agricultural literacy study reported by Frick, Kahler, and Miller (1990) found agriculture's important relationship with natural resources to be included as part of broad definition of agricultural subjects that should be part of the agriculturally literate persons vernacular.

A new vision of agricultural education includes environmental stewardship and natural resources as part of a new definition of agriculture (National Council for Agricultural Education, 1998). The NRC (1988) views the use and conservation of land and water resources encompassed within the field of agriculture and natural resources.

What role if any, should agriculture educators play in the delivery of environmental education? A study of Oklahoma secondary agriculture teachers (Brink, 1974) found that 84 percent believed environmental education should be taught. Eighty-six percent reported incorporating environmental education within regular subjects rather than providing a separate course to provide such material. Yet nearly 60 percent of the responding agriculture teachers were opposed to volunteering to teach an elective subject in environmental education (Brink, 1974). At that time Oklahoma agricultural education teachers believed science teachers should be teaching this subject.

Considerable public attention has been drawn to the effects of agriculture on the environment. Reports of herbicide seepage into ground water supplies, animal waste runoff in surface waters, soil erosion, air pollution, and destruction of wildlife habitat are parallel to "an emerging interest by many farmers to a more cost effective and environmentally benign agriculture" (USDA, 1990). According to the Minnesota Legislative Reference Library (1998), a controversy has developed over large livestock feedlots in Minnesota. The focus of the controversy is the effects the feedlots have on the environment. The concerns include air pollution, groundwater contamination, surface water contamination, and the long-term reliability of waste containment facilities (MLRL, 1998).

Americans are approaching a crossroad when it comes to making decisions regarding economic growth and conserving natural resources. Citizens of a Kansas community successfully halted the establishment of a large-scale livestock processing facility. An estimated 2,400 jobs would have contributed to the local economy however, there was concern over the competition for water resources and sewage-waste management (Peterson, 1998). The utilization and adoption of a curriculum by a secondary agricultural education instructor is dependent upon several factors: knowledge and experience of the instructor, community needs and expectations, education requirements of the local governing education agency, and state education requirements. What students needed to learn in the world of 1917 when agricultural education received federal validation may not be suitable for students in the world of the year 2000. To meet the challenges of a changing society and a changing physical environment, the focus of what is taught must also change (NRC, 1988).

Students make a strong connection to the environment and are aware of the importance of environmental issues (Rockland, 1995). In research conducted to measure the effectiveness of a K-12 curriculum guide teaching about environment and food and fiber production in increasing student knowledge, the largest measure of increase in student knowledge was related to environmental themes. (Hubert, Frank & Igo, 1999).

Terry, Dunsford, and Lacewell (1996) hypothesized that the general public must understand the relationship agriculture has with the environment to make sound policy decisions which affect either entities. Williams & Wise (1997) reported that human needs and environmental issues now temper agricultural systems of the past that once focused only on economical goals.

Bessire's (1992) study revealed that personal interest of the agriculture instructor ranked highest for reasons of adding a natural resource component to high school agricultural education curriculum, while public interest ranked second. Developing student awareness concerning the environment, information about the use of natural resources and the development of an environmentally responsible citizenry were the most frequent responses to the question of purpose of the course.

Brink (1974) found that eighty-four percent of agricultural education teachers believed environmental education should be taught to high school students. The majority of his subjects reported incorporating environmental education with in regular subjects rather than providing a separate course to provide such material was the preferred method of delivery. The study reported that although agricultural teachers favored the concept environmental education being taught in the high school more than half were opposed to volunteering to teach an elective subject in environmental education (Brink, 1974).

According to the Strategic Plan for Agricultural Education (1989), a national goal is to provide leadership and cultivate strong partnerships in the total educational system. In order to contribute and receive ideas, agricultural educators must seek to participate in activities with other professional organizations, which strive to achieve parallel goals of creating a literate society about the effective use and management of the environment. Professional development activities that focus on non-traditional agriculture curriculum topics must be available to all agricultural educators.

Kirts (1990) reported that agricultural education and environmental education have similar goals and practices and are complimentary to each other and stressed an association between both professions will be beneficial in the instruction of natural resources (1990). This falls in line with the recommendation by the Committee on Agriculture as found in the green book, Understanding Agriculture: New Direction for Education (1988). Environmental Science is emerging as a curriculum area in secondary agricultural education that is slowly gaining recognition for aiding the effort of integrating science standards into the existing agricultural education curriculum. However, environmental education as a self-contained curriculum has not been established as a stand-alone science course in the secondary education system.

Where will the public receive information necessary to make rational decisions that affect public policy about agriculture and the environment? A longitudinal study found schools were replacing the media as means of elementary student acquisition of knowledge about the environment (Fortner & Mayer, 1991). Yet a 1974 study found that 74 percent of youth are learning about the environment from television and other media sources (Rockland, 1995).

In the 1998 National Research Council's Committee report on Agricultural Education in Secondary Schools, the inclusion of the "utilization of environmental and resource management" into the recommendation that all K-12 students receive some systematic instruction about agriculture was an attempt to recognize the importance of environmental literacy to all students.

The literature suggests that in-service programs be offered to assist teachers in integrating science into the agricultural education curriculum (Kirby, 1990; Neason, 1992, Newman and Johnson, 1994; Thompson & Shumacher, 1998).

Environmental education had a positive effect on 4^{th}, 5^{th} and 6^{th} grade student attitudes toward science and social studies (Scwartz, 1987). Previous research suggests that after experiencing environmental education, students may develop more responsible and concerned attitudes toward the environment (Conroy & Jeroski, 1982; Egan & Seidel, 1973). When environmental education is integrated, the science curriculum is most frequently identified as the area best suited for environmental education, followed by the social science curriculum (Tewksbury & Harris, 1982).

Professional Development for Teachers

Professional development programs in environmental education seek to not only improve teacher's interest about the subject but to build upon their ability to teach environmental education within their own curriculum (Heald & Pilzecker, 1995).

Teacher development permits three kinds of connections: a physical connection between the teacher and the resource, interpretive connection between teacher, and themes of resource, social connection among teachers (Heald & Pilzecker, 1995). Agricultural education teachers continuously desire and need in-service education, particularly in technical subject matter (Barrick, Ladewig, & Hedges, 1983). In-service education topics arise from an assessment of the needs of a community, school, teacher or student (NRC, 1996). When teachers are involved in the planning of the in-service program, the level of implementation or participation increases (Waters and Haskell, 1989). Workshop content is connected to mission of site, organization or resource. Workshops may provide teachers with new information and raise awareness. Workshop participants gain knowledge through physical or experiential interaction (Heald & Pilzecker, 1995).

When designing inservice teacher training in environmental education to focus on the needs of youth. Stapp (1967) outlined minimum prerequisites for informed citizens. These "tools" were to be taken into consideration during the planning of environmental education inservice training for teachers. They are:

(1) Strong general education – education training that will enable students to think clearly and critically to be able to articulate their thoughts through speech and writing; to widen their interest range in daily experience; and to develop a "questioning mind".

(2) Understanding of our natural resources –their characteristics, status, distribution, and importance.

(3) Ecological awareness – a blending of field and classroom experiences that will help youth develop a greater interest, awareness, understanding, and respect toward man's environment.

(4) Economic awareness – an understanding of economic theory so to better understand the role of economics in resource decisions.

(5) Political awareness – an understanding of the American political process at the national, state, and local level, and ways that the individual can be effective in helping to promote sound environmental resource decisions.

(6) Problem solving – inherent in this is the ability to define the problem, consider all related viewpoints, and, on the basis of substantial facts, determine the best solution.

(7) Understanding that man is a part of the human ecosystem – recognition that man is a part of his environment and is expected to make contributions to society according to his ability (p.33).

It is important for program developers to understand the effects of a professional development program on classroom behavior of teachers to which model the material content and process elements of their workshop training into their classroom teaching (NRC, 1996). Kunz (1990) studied the effects of a Project Learning Tree workshop on one hundred and forty pre-service teachers' attitudes toward teaching environmental education after a seven-hour workshop. A significant positive change in attitude toward teaching environmental education was recorded using an environmental education attitude scale.

Evaluation of Workshops

Program evaluation takes many forms and not all-professional development programs are evaluated in the same manner. Program evaluation is most effective if it is built-in during the introductory planning stages of a program, if it measures the success of a program against its stated goals, and it continues throughout the life of the program (National Research Council, 1996). The following suggestions are provided by the National Research Council (p.75, 1996) to aid program planners to include an evaluation component to their program:

- Define specific, realistic, important and measurable program goals.
- Identify content and process skills that are appropriate to teachers and their students.
- Choose instructional strategies and follow-up activities that consistent with the objective of the program and reinforce core concepts.
- Establish mechanisms for receiving continuing participant feedback.
- Establish, before the program begins, procedures and instruments for collecting overall program-evaluation data.
- Examine a program's cost effectiveness or efficiency.

FIT participants assume very little cost with attending the workshop other than travel expenses. Lodging, meals, curriculum materials and field trip transportation expenses are covered by the Institute. Additionally, a stipend has been paid to each participant who completes and submits a curriculum project (Forestry Institute for Teachers, 1999)

According to the National Research Council (1996), the ultimate impact of a professional development program should be determined by a long-term evaluation. This is accomplished by keeping track of program participants and how they incorporate new information and techniques into their classroom instruction.

Workshop evaluation aids in planning for future workshops. Success in conducting an in-depth evaluation with outside funding involves initial teacher needs assessment, an ongoing evaluation of programs as they are developed and piloted, and an evaluation of the collaborative process (Heald & Pilzecker, 1995). Summer institutes are a popular model for providing in-service education to teachers (Parks, 1970; Balschweid, Thompson, & Cole, 1998; Wilhelm, Cox & Terry, 1998) as regular school-year classes have released providing teachers with the flexibility to schedule professional development opportunities.

The term workshops first appeared in the 1930's and were intended to be problem solving, action-oriented in-service work groups. The first workshop was conducted over the summer of 1936 on the Ohio State University campus. Teachers in attendance worked on the development of instructional resource units and devices to evaluate curriculum components. In the present, the workshop continues to be a recognized method of providing in-service education. There are certain characteristics workshops possess that contribute to their value as a means of providing in-service education (Moffitt, 1963).

There have been numerous studies detailing the extent of the delivery of environmental education (Trent, 1974; Bottinelli, 1976; Cantrell, 1987; Burris, 1977; Schwartz, 1987; and Smith, 1988) in the school system.

A study conducted of secondary schools in Nevada showed that little environmental education was being delivered (Trent, 1974). Teachers indicated that there was inadequate in-service material in environmental science provided to them. Further, it was reported that schools and teachers required assistance in planning, developing and implementing environmental science courses and curriculum units.

A Colorado study conducted by Bottinelli (1976) revealed that 95 percent of the instruction in environmental education was conducted in social studies and science courses. The instructor was the most frequent determiner of the content of environmental education materials in these courses. Majority of the instructors lacked pre-service training in environmental education fields, which resulted in a limit of knowledge in environmental education concepts. Instructional delivery strategies were limited to teacher-oriented lecture and discussion combined with textbook assignments. The study indicated the need for increased instructor training at the pre-service level in environmental education (Bottinelli, 1976).

Cantrell (1987) examined the process of curriculum implementation through the use of Project WILD in one Midwestern state. Burris (1977) conducted a follow-up study of an outdoor conservation education leadership-training program held during the summers of 1975 and 1976 in Oklahoma. Focus of the research was to determine to what extent participants met workshop goals. Urban teachers were found to implement more outdoor conservation education program than rural teachers, however, there was no significant difference of implementation between science teachers and non-science teachers. According to Burris (1977), evidence of administrative support was a factor in regards to implementation of an outdoor conservation education program.

Schwartz (1987) conducted research to determine the effect of integrating environmental education instruction into the existing class curriculum on student's attitude toward the class curriculum. Specific curriculum areas were reading, math, science and social studies. A comparison of the control to the treatment group found a significant difference in student attitudes toward science and social studies after experiencing environmental education instruction activities.

Smith's (1988) study of Oklahoma teachers participation in a Project WILD workshop found differences existing between rural, suburban and urban instructors regarding the use of environmental education materials. Rural educators indicated a very low priority of environmental education material use for the reason of "incorporating environmental topics into the curriculum'. Additionally, rural educators reported a lower priority of using environmental education materials to "meet science requirements" than did suburban instructors. Smiths' interpretation of this finding was the rural educators' expectations of their students' to have preconceived grasp of specific environmental education concepts, while suburban and urban instructors felt their students did not have access to environmental experiences prior to their exposure to the material.

Successful workshops share common characteristics. Among these are:

1. Appropriate physical conditions for group.
2. Availability of consultants.
3. Learn by doing atmosphere promoting a high degree of participant activity (Moffit, 1963).

Environmental Knowledge and Attitude

Environmental education began to emerge as a separate field of education during the mid 1960's. A variety of related fields are tied to its development—conservation education, nature education, resource-use education, outdoor education, geography, science, and ecology. There is differing opinions regarding the importance of information and attitude in the development of environmental education programs (Cohen, 1973). Cohen (1973) compared the environmental attitudes of two groups of high school students who had different amounts of environmental information. Attitude was defined as favorable or unfavorable responses to statements. Data from Cohen's (1973) investigation supported the notion that the group with more environmental information has different attitudes than groups with less environmental information.

According to Knapp (1972), the barriers that exist which prevented the instructor from determining student environmental attitudes were the lack of good instruments. Further, Knapp (1972) believed teachers should be encouraged to develop ways to influence student attitudes about the environment. A difficulty with dealing with attitude data is determining whether the statements the individual agrees or disagrees with is a value that serves as a force effecting the choices one makes in everyday situations or simply an attitude, feeling or belief (Cohen, 1973).

Stamm and Bowes (1972) suggest that the strength and nature of a persons' environmental attitude is closely related with the information they are exposed to as well as previous knowledge of environmental issues, and those whose activities they are likely to support and see themselves in agreement with.

Houndshell and Liggett (1973) reported a positive correlation between knowledge and attitudes of 2500 sixth grades students. The researchers reported that urban school students scored significantly higher on knowledge than students from rural areas, though no difference was found on measurement of attitude between groups.

Perkes (1973), using the same inventory as Houndshell and Liggett (1973), found significant differences existed between males and females in regards to environmental attitudes.

In an Iowa study conducted by Wievel (1947), an attempt was made to measure attitudes toward and knowledge of conservation of high school freshmen and seniors. Using a self-devised instrument Wievel concluded from the results the following:

(1) Students whose grades were above averages made higher marks on the attitude scale and general achievement test that students whose grades were average and below.

(2) Significant differences in attitude and general and specific achievement existed among the grade level groups with seniors making higher scores on all parts of the test than freshman.

(3) Place of residence when classified as farm and non-farm, was associated with significant differences in general achievement and achievement in soil conservation. Farm students produced higher scores on these parts of the test. Students living on farms did not differ significantly in their attitudes, or in achievement in wildlife, forest, and mineral or water conservation from non-farm students.

(4) Students who had taken a greater number of courses in the natural sciences had more favorable attitudes toward conservation and made better scores on the general achievement test.

(5) Students who had taken some courses in agriculture made higher scores on all parts of the test than students who had not taken these courses.

(6) There was a tendency for students who had taken a greater number of courses in the social sciences to have slightly more favorable attitudes toward conservation and to make slightly lower scores on the general achievement test.

(7) There was a significant tendency to students who had engaged in a greater number of conservation activities to achieve better scores on both the attitude scale and general achievement test.

(8) Males made higher scores than females on all parts of the test and these differences in scores were significant, except in the case of achievement in mineral conservation (pp.73-76).

George (1966) compared results of his school students, college student adults using a Likert-type attitude scale related to environmental conservation. Differences in attitude scores between groups were compared. Followed by relating scores to factors affecting conservation attitudes, personal characteristics, extra curricular activities and 4-H conservation projects. A third phase examined the attitude change results from a "special conservation education experience" appropriately designed for each of the three groups. Significant differences in attitudes were found when group mean scores all three groups were compared. Of four demographic characteristics analyzed (age, education, gender and residence) it was reported that age and education were associated with the most significant differences in attitudes of the high school students.

In a study of tenth grade student attitudes toward environmental quality, and health knowledge, Eaton (1971) compared data from a vocational agriculture class, a tenth grade biology class, and a random sample of all tenth grade students from twelve randomly selected schools in Pennsylvania. A semantic differential was employed to measure environmental attitude and knowledge and application was evaluated using a health education test. There was no significant correlation found between health knowledge and environmental attitudes for the random sample of tenth graders. However, Eaton (1971) found a significant positive relationship was to exist between health knowledge and environmental attitude among males enrolled in vocational agriculture and biology students.

Perkes (1973) study examined environmental knowledge and attitudes of tenth and twelfth grade students from 199 schools randomly selected from the states of Illinois, Indiana, Michigan, Ohio, and Wisconsin in the Great Lakes region as well as the far west states of Alaska, California, Hawaii, Nevada, Oregon and Washington.

A notable piece of research conducted in 1976 by Bohl (cited in Roth, 1976) was a national survey involving over 15,000 students. The findings indicated that at similar grad levels, students fared poorly on a grasp of factual environmental knowledge, yet tended to express a positive environmental attitude in response to questions of the affective domain.

In a 1979 study of factors that demonstrated the influence of environmental education on particular environmental attitudes, Gifford, Hay and Boros (1979) reported a difference existed between males and females in terms of environmental knowledge as well as natural science majors having more environmental knowledge than social science majors. The researchers provided the following summary of their findings:

> Environmental education students not only know more and are more verbally committed to the environment, but they report more actual commitments than non-environmental education students. These results provide empirical support for the existence for the educational outcomes that environmental education strive for. In sum, attitude is importantly related to individual difference measures. Greater understanding of the individual differences in relation to the environmental attitude will create greater potential for designing and implementing programs that work well (p.23).

Whent and Williams (1990) reported similar findings in an agricultural format. Conclusions based on their research suggest that instructional materials focusing on conservation of natural resources need to address both rural and urban students enrolled in agricultural education classes. They further suggest additional research is needed to "investigate the causal relationship between teacher attitude (positive) toward teaching natural resources and student posttest knowledge" (p.188, Whent & Williams, 1990). Within their study, Whent and Williams (1990) found that an instructional unit on environmental instructional technology did not significantly change students' attitudes toward natural resources. This confirms similar findings conducted by other researchers (Hosseini, 1983; Birkenholz, 1982) using attitudes of secondary agricultural education students as the dependant variable in evaluating instructional materials.

Jaus (1982) presented the results of an investigation with fifty-three fifth grade students. One class was exposed to forty minutes of environmental education instruction for a period of fifteen days. A control class at another school received no environmental education instruction. Both groups were administered a twenty-item five-point Likert-type scale instrument developed by the researcher to measure environmental attitudes. The experimental group demonstrated twenty-two percent higher in more “positive” environmental attitudes than the control group.

Edwards and Iozzi (1983) conducted their research at a summer institutes/workshop for in-service teachers at Cook College, Rutgers University of New Jersey, in 1979. The four-week Environmental Education Institute was designed to expose teachers to a variety of environmental problems. Activities were designed to promote cognitive and affective growth related to environmental issues and to introduce new methodologies for translating these experiences into classroom applications. Twenty-nine teachers participated in the study. The Ecology Attitude Inventory (Maloney and Ward, 1973) was utilized in the study as a (1) pre-test, on the first day of the institute, (2) post-test, on the last day of the institute, and (3) mailed delayed post-test, one year after, and again two years after the institute.

Mason and Kahle (1988) concluded that it was unlikely that additional mandatory science courses would improve negative attitudes regarding science. They advocated nurturing the students interests, curiosity, and confidence thereby, improving student motivation. Iozzi (1989) concluded from reviews of literature that the relationship between knowledge and attitudes was unclear. Mueller (1986) indicated that attitudes were not always good predictors of behavior.

The acquisition of knowledge about the environment has changed. A study of Ohio fifth and ninth graders reported that school classes were increasingly influential in the acquisition of environmental knowledge. Students ranked movies and television as the most influential source of knowledge about specific environmental issues in 1979, by 1983 and 1987 those sources had been replaced by classes in school as being most influential. (Fortner & Mayer, 1991).

According to Singletary (1992), high school environmental education courses are often the last formal exposure to environmental issues for non-college bound students. These courses may be utilized as valuable opportunities for extending knowledge on environmental issues and disseminating materials. Such courses can culminate environmental experiences and can clarify and structure knowledge and skills gained from earlier experiences (Singletary, 1992).

A study conducted by Moseley (1993) concluded that gender, ethnicity and community background were not significantly correlated with any component of environmental literacy. Moseley (1993) conducted her study utilizing 54 students representing junior and senior high school students from the across the state of Oklahoma. Twenty-four students participated in the Oklahoma State University Summer Academy for Environmental Science. This represented her experimental population. The comparative population consisted of thirty students enrolled in the Oklahoma State University Aerospace Academy.

Hoody (1996) reports of a program's longitudinal impact on environmental attitudes of 3,278 sixth graders who attended an outdoor science school. The researcher was able to contact high school seniors who had attended the outdoor school in 1975-76. Surveys were returned from 449 students. Ten topic areas were represented on the survey instrument including interest in natural sciences, appreciation for the environment, feelings about conservation/preservation, and potential value of outdoor school for other students. A positive impact was measured. Student responses indicated a fifty-nine percent increased interest in natural sciences; eighty percent increased appreciation for the environment; seventy-seven percent of the respondents indicated an increased positive feeling about conservation and preservation of wilderness and national forest areas. Ninety-five percent reported the experience "was one that every sixth grader should have".

Eagles and Demare (1999) found that a weeklong resident environmental education camp for sixth graders produced no significant difference in ecologistic or moralistic attitudes. Their results suggest that students entered the program with specific levels of attitudes derived from several influences including family, media and previous exposure to school-related environmental education programs.

Paraskevopoulous, Padeliadu, and Zafiroupoulos (1998) findings of 686 school children in Greece indicated that immediate experience as well as content of textbooks influenced environmental knowledge.

Bradley, Waliczek, and Zajicek (1999) conducted a study of high school student's knowledge and attitudes of the environment after completion of a ten-day environmental science course. The researchers found a significant correlation existed between pretest knowledge scores and pretest attitude scores and between posttest knowledge scores and posttest attitude scores. Students with higher knowledge scores had more favorable environmental attitudes compared with students with lower environmental knowledge scores. However, Kuhlemeier, Van Den Bergh, and Lagerweij (1999) found the relationship between environmental knowledge and attitudes of Dutch secondary students to be nonsignificant.

Armstrong and Impara (1991) evaluated the impact of an environmental education program in classrooms used as a curriculum supplement. A pretest/posttest design produced few significant differences between the treatment group exposed to the material and the control group.

A national study of American youth in grades 4-12 was (Rockland, 1995) was commissioned by the National Environmental Education and Training Foundation (NEETF) to determine their environmental concerns, education and actions. The 1994 study conducted by Roper Starch Worldwide focused on 982 students from 42 schools (Rockland, 1995). Major findings from the study found girls were more likely to worry about he environment than boys, 74 percent report learning about the environment from television, 50 percent from school, 31 percent from newspapers and 28 percent from their families. The highest levels of knowledge about the environment came from younger students in grades 4-5; this age group provided the highest ratings of the quality of environmental education they received in school (Rockland, 1995).

Summary

The creation of an environmentally literate populace is the ultimate goal of environmental education. What knowledge, skills, and attitudes the environmentally literate person must possess is the question.

A review of the literature finds that formal evaluations of professional development workshops in general, including environmental education, do not exist. This provides justification for such a study. Additionally, a new national vision of agricultural education defines natural resources as a part of agricultural education instruction. There are two methods to accomplish this goal. One is to infuse environmental education into existing agriculture science curriculum. This may be accomplished through the dissemination of information and skills to agricultural education instructors through the use of quality professional development workshops.

The second method is the development of specialized courses focusing on agriculture and the environment that meets the existing graduation requirements of local school districts. Concerns for levels of quality of environmental resources continue to increase not only nationally but also globally. Who in the classroom is better prepared to serve in the role of environmental steward than the agriculturist?

This study investigated several areas of environmental education and its link to agricultural education in the secondary schools of California. The procedures used in this study to evaluate the transfer of environmental knowledge and attitudes and to collect data for analysis are reported in Chapter III.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to describe the methods and procedures used to conduct this study. Chapter III contains a description of the samples and comparative populations and overview of the Forestry Institute for Teachers workshop. The instruments utilized, which include the workshop participant questionnaire and the students' environmental knowledge and attitude assessment are described and the processes for their administration and statistical analysis is presented

The Institutional Review Board (IRB)

Federal regulations and Oklahoma State University policy require review and approval of all research studies that involve human subjects before investigators can begin their research. The Oklahoma State University Office of University Research Services, through the Institutional Review Board (IRB), conduct this review to protect the rights and welfare of human subjects involved in biomedical and behavioral research. In compliance with the aforementioned policy, this study received proper review and granted permission to proceed. The Institutional Review Board assigned the number AG-00-049 to the Forestry Institute for Teachers Evaluation study. A copy of the IRB approval form may be found in the appendix.

Objectives of Study

The objectives of this study were as follows:

1. To develop a profile of Forestry Institute for Teachers (FIT) participants.
2. To determine frequency and method of use of environmental education materials provided to teachers by FIT.
3. To identify if perceived barriers exist that prevent teachers from integrating environmental education topics into the curriculum.
4. To identify areas for improving the FIT program.
5. To determine what impact FIT had on the environmental knowledge and attitudes of agricultural education teachers who completed FIT and their students when compared to a similar group with no FIT experience.
6. To determine if relationships exist between and among personal characteristics of teachers and students and environmental literacy.

Research Methodology

The design of the study was a descriptive survey of a sample of two separate populations. One survey sample consisted of randomly selected graduates of Forestry Institute for Teachers (FIT) summer workshops. The survey was fashioned to evoke initial perceptions of graduates concerning workshop content and materials presented for curriculum implementation. The second sample examined agricultural education teachers who participated in a Forestry Institute for Teachers (FIT) workshop and their students. The review of literature revealed that evaluative instrumentation of professional development workshops focusing on environmental education for agricultural education was limited. Therefore, adapting existing environmental education designs, methodology and instrumentation appeared to be the most practical avenue of procedure.

Population of the Study

Two separate populations were examined in this study. Each will be described in separate sections of this chapter. One population consisted of all 730 teachers (Kindergarten through 12th grade) who had participated in Forestry Institute for Teachers (FIT) summer workshop conducted from 1993 to the summer of 1999. The second population was made of California agricultural education students, purposefully selected, enrolled in programs taught by agricultural education instructors who completed a FIT workshop, another group whose instructors did not complete a FIT workshop but taught a course in environmental science, forestry, or a related subject.

Forestry Institute for Teachers (FIT) Population

The administrative staff of FIT was contacted and a database of names and addresses of all FIT workshop attendees from 1993 to 1999 was obtained. The survey frame indicated a total of 730 participants. The frame was reviewed to remove duplicate, missing, and foreign elements. Participants with no available or forwarding address were automatically removed from the study, along with participants listing an out of state address. The corrected frame indicated that the population of FIT graduates consisted of 700 K-12 teachers. The remaining names and addresses were entered into a spreadsheet and assigned an identification number. Due to cost and time, a sample of the study population would be studied.

To draw legitimate inferences about a population from a study sample, that sample has to be representative of the population and randomly selected (Popjham and Sirotnik, 1973). A table for estimating the sample size based on confidence level needed from a given population was consulted. According to tables produced by Krejcie and Morgan (1970), 248 teachers were needed to comprise the sample that would be within ±0.05 of the population of 700 with a 95 percent level of confidence.

A random number generator was adopted to determine which subjects would be sampled from the population. Since the sample population resided in California, it was decided that due to time and expense a mailed questionnaire would be the appropriate method of data collection. To compensate for time and to reduce low response error oversampling was conducted. Four hundred and fifty four numbers were randomly generated. These numbers identified which members of the study population would be selected as the sample population.

Agricultural Education Students of FIT or Non-FIT Instructors

To determine the impact of the FIT workshop on students learning, a student population needed to be identified. The national mission of Agricultural Education includes instruction in the area of forestry and natural resource management (NAE, 1998). The main objective of FIT is to provide K-12 grade teachers with the information and tools to effectively teach a balanced curriculum of forest ecology and forest resource management of the environment. As forestry and natural resource management are part of the California State curriculum in agricultural education it was determined that an appropriate student population to study would be agricultural education students enrolled in secondary programs offering forestry or natural resource.

The agriculture student population was purposely divided into two subgroups. One group consisted of all high school agricultural students of secondary agriculture education instructors who completed a FIT workshop. The second group was a purposive sample of high school agriculture students enrolled in forestry or natural resource management courses instructed by secondary agriculture education teachers who have not participated in a FIT workshop. Names of instructors of forestry, natural resource management, or environmental science in agriculture was obtained from agricultural education regional program consultants of the agricultural education division of the California Department of Education.

Agriculture Student Population

A purposive sampling of FIT graduates was conducted to locate all secondary agricultural education teachers who completed a FIT workshop. Names were cross-referenced with the most recent directory published by the California Agriculture Teachers Association (CATA). Agricultural teachers identified from the FIT graduate database as workshop participants were contacted by telephone to provide assistance with locating other instructors who completed a FIT workshop but were missed during the database search. A random sample of secondary agricultural education teachers instructing courses in forestry, natural resource management, or environmental science from similar geographical areas as the FIT graduates were identified for inclusion in the student knowledge & attitude assessment of the study.

Instrumentation

Through a review of the literature and meetings with the thesis advisory committee, two specific survey instruments were developed to meet the objectives of the study. The instruments were patterned after similar instrument designs reported in the literature of both agricultural education and environmental education publications. The instruments were outlined parallel to the population-group-specific objectives of the study. The graduate committee provided direction for developing and clarifying objectives. Each questionnaire was specifically designed to elicit responses toward fulfillment of a stated, related objective.

FIT Participant Questionnaire

The FIT workshop graduate instrument consisted of six sections: (1) frequency of use of FIT activities (11 questions); (2) use of FIT materials (10 questions); (3) integrating environmental education into curriculum (11 questions); (4) barriers to implementing environmental education into existing curriculum (15 questions); (5) improving FIT workshops (10 questions); and (6) demographic information of participants (10 questions).

Section one of the questionnaire consisted of eight open-ended questions and three scale-type variable statements. The open-ended questions were designed to solicit each individual's frequency of use of FIT activities in the classroom, the number of classes exposed to the FIT material, the number of daily lessons' using environmental education material, and the number of students taught using FIT activities. Variable choices were "increased", "decreased", or "remained the same" or "remained unchanged". The six point "Likert-type" scale of categories allowed respondents to rate their level of agreement in relation to specific question in sections two, three, four, and five of the questionnaire. Numerical values were assigned to aid in clarification and determine unified levels of importance of each category of response: not applicable = 1; strongly disagree = -2; disagree = -1; neither agree nor disagree = 0; agree = 1; strongly agree = 2. Real limits were set at -1.50 to - 2.0 for strongly disagree; -0.50 to -1.49 for disagree; -0.49 to 0.49 for neither agree nor disagree; 0.50 to 1.49 for agree; and 1.50 to 2.0 for strongly agree. Responses of non-applicable were treated as missing elements and were not calculated toward mean responses to statements.

Several open-ended questions permitted respondents to indicate what activities were used most with students, what FIT-related subjects were taught, improving the content of FIT workshops, and what material should be offered in an advanced FIT workshop.

The intent of this was to accurately depict the type of educator likely to participate in FIT workshops, their level of use of workshop materials, success of implementation, and improvement for future workshops.

Graduate students within the Department of Agricultural Education, Communications & 4-H, as well as FIT staff members, a community college forestry instructor, and an environmental education faculty member reviewed instruments for content validity. Revisions were made to the final version of the questionnaire.

Agriculture Student Questionnaire

The student assessment instrument was comprised of three sections: (1) student demographics; (2) environmental knowledge assessment (15 multiple choice); and (3) environmental attitude assessment scales (27 Likert-type statements). Demographic data collected included gender, grade level, description of community, and name of class in which the questionnaire was administered. The questionnaire consisted of two parts. The knowledge subscale was made up of fifteen-question forced-answer type items. Knowledge questions were multiple-choice with five possible choices but only one correct answer. A student obtained a single knowledge score based on the number of questions answered correctly with a score of a zero (0) assigned for each incorrect response and a score of one (1) for a correct response. The minimum score possible was zero (0) with a maximum score of fifteen (15) being possible. Thirty-one high school students pilot tested the instrument. A Guttman Split-Halves reliability correlation was computed using a Microsoft Excel data analysis package. The reliability coefficient for the knowledge subscale was computed at 0.7906.

The attitude subscale was made up of twenty-seven statements structured with a five-point Likert-type scale. Response options to the attitude questions were "Strongly Agree", "Agree", "Neither", "Disagree", and "Strongly Disagree". This assessment was used to measure the students' attitudes toward the use and protection of the environment and was developed with a combination of existing measurement scales (Burrus-Bammel, 1978; Armstrong & Impara, 1991; Bradley, Waliczek & Zajicek, 1999). Scores were based on the student responses on the Likert-type scale. Each possible response was assigned a value that corresponded to that of an environmentally conscious-minded individual. A student obtained a single attitude score that fell between –54 and 54. A neutral score of zero (0) occurred if students answered in the mid-range of neither agreeing nor disagreeing to the statements. This indicated that the student was either indecisive or had no opinion about that statement regarding the environment. A score of a positive two (+2) coincided with that of an environmentally conscious-minded individual, while the response of a less environmentally conscious-minded individual received a score of a negative two (-2). An attitude score of greater than zero (0) represented an overall favorable environmentally conscious attitude. Scores less than zero (0) indicated an overall attitude of a less than environmentally conscious-minded individual.

Revisions to the instrument were made with the assistance of an environmental education faculty member. A pilot test of the student knowledge & attitude assessment was conducted with students from a nearby high school. After pilot testing, a Cronbach's Alpha was established at 0.8299.

Data Collection Procedures

FIT Workshop Participants

Questionnaires were mailed to a random sample of 454 FIT graduates. Each instrument was individually coded in order to avoid the cost of duplicating and mailing instruments to participants who had completed and returned the questionnaire.

Multiple contacts, the contents of cover letters, incentives, and personalization influence the response rate more so than questionnaire design (Dillman, 2000). To obtain a high rate of return, a variation of the Dillman' Total Design Method (2000), was adopted.

The FIT workshop questionnaire (refer to Appendix A) was designed to be a self-mailer to reduce the cost of mailing additional envelopes and to simplify the return process for the respondent. The design was formatted after the FIT application packet, utilizing the same color paper and font.

During the first week of February 2000 an individually addressed and signed pre-notice letter (refer to Appendix C) was mailed to each survey participant explaining the purpose of the study and alerting the arrival of the questionnaire in the following few days.

Packets containing a second cover letter and questionnaire (refer to Appendix B) were mailed four days after the pre-survey letter. The detailed cover letter explained the purpose of the study and indicated that the person's response would be greatly appreciated.

After two weeks, 120 completed questionnaires had been returned for a response rate of 26 percent. Thirty-seven questionnaire packets were returned with non-forwarding addresses. An attempt was made to contact those respondents with non-forwardable addresses. The FIT participant database was consulted to locate a secondary or school address for those participants whose questionnaires were returned. Seventeen of the 37 returned packets listed a school address. A replacement set of packets was developed and mailed to these addresses. No completed questionnaires were received from this group. Because of this, these 37 participants were removed from the sample population and deemed as missing elements to the survey frame. Thus the survey sample was reduced from 454 to 417 members.

Approximately three weeks following the first mailing of the questionnaire, a replacement questionnaire with a teabag enclosed as an incentive and a second cover letter was mailed to the non-respondents. The cover letter indicated that the person's completed questionnaire had not been received and urged the participant to respond. By including the email address of the researcher, participants were provided an opportunity to communicate any comments or questions regarding the study. One participant took the opportunity to compose a detailed electronic letter complete with responses to each of the questions from the survey.

Two weeks following, a reminder postcard (refer to Appendix D) was mailed to each non-respondent. The card expressed appreciation for responding, and requested that if the completed questionnaire had not yet been mailed it be hoped that it would be returned soon. This elicited feed back from participants in the form of telephone calls and electronic mail requesting a replacement questionnaire.

A final contact was made by telephone to those non-respondents with available and current listings during the first two weeks of May. The purpose was to solicit responses from participants not responding to the mailed questionnaires and to determine if nonrespondents were significantly different than respondents. Following the second mailing of packets and the postcards, another 91 completed surveys were returned for a total of 222 of 417 or a 53 percent rate of return. According to Wiersma (1995), a 70 percent response is considered a minimum response rate when surveying professionals, however, when surveying the general public more non-response can be tolerated. In some studies it is argued that nonrespondents are neutral in their feelings or may be disinterested in the issue (Wiersma, 1995). In some studies, according to Wiersma

(1995), non-respondents may be neutral in their feelings or disinterested in the issue. This could be used when interpreting the data, and a higher non-response rate would be tolerable before contacting nonrespondents. Wiersma (1995) reported this was more likely to be valid when surveying a general public population rather than a professional population.

By conducting a cross check of returned completed coded questionnaires to a master spread sheet, the researcher was able to locate sample population members that failed to respond after two mailings of packets and a reminder postcard. A list of telephone numbers of nonrespondents was developed. Missing or no longer in service numbers were determined and those assigned these numbers and sample member names' were removed from the non-respondent list as impossible to contact.

Telephone contact was made during the first week of May to approximately 10 percent of the non-respondents (21) in an effort to determine if differences existed between non-respondents and those participants who responded to the survey. Responses were coded separately and compared to survey respondents. No significant differences were found in respect to levels and methods of implementation of FIT materials into classroom curriculum, perceived barriers to implementation, and recommendations for workshop improvement.

Agriculture Student Questionnaire

In regards to the student environmental knowledge & attitude assessment, it was necessary to identify agricultural education teachers who completed a FIT workshop. They would be compared to agricultural education teachers who had not completed a FIT workshop.

Six California agricultural education teachers were identified from the FIT participant database. A preliminary phone call to each instructor was made to solicit his or her participation in the study. Students of these instructors would compose the treatment or effect group. Additionally, a list of fourteen California secondary agricultural education instructors known to be teaching forestry or natural resource management or environmental science in their agriculture programs but not having completed a FIT workshop, were contacted by telephone to solicit the participation of their students as the control or comparison group. Assistance in identifying these teachers came from the California Department of Education Regional Agricultural Education Program Consultants. Phone calls were initiated during the month of October 1999.

All teachers contacted agreed to take part in the study. Their responsibility was to administer and collect the student assessment forms from their students. To accomplish this, each was sent a packet of instruments along with a cover letter explaining the purpose of the research along with directions for dissemination and administration of the student assessment instrument. Confidentiality assurances, descriptive information about the class and return mailing instructions were included. Instructors were also asked to participate in the study by taking the same knowledge and attitude assessment. A comparison would be made to determine if there was a correlation between teacher environmental knowledge and attitude and student knowledge and attitude.

Data Analysis

FIT Workshop Participants

The data received from the workshop graduates were analyzed with descriptive statistical treatment, employing the use of frequency distribution format, with means, percentages, frequencies and ranked orders with interval data. Where it was deemed appropriate, the data were analyzed using means, standard, deviations and variance, and generalized through inferential treatment.

Agriculture Student Questionnaire

The data generated from the student environmental knowledge & attitude assessment was analyzed by examining frequency and percentages of correct responses on the knowledge sub scale and determining the existence of a relationship with positive attitude responses on the attitude sub-scale. A comparison was made by the use of a t-test to determine if a significant difference existed between the two student groups. Analysis of variance was employed to determine differences existing between groups of students based on the size of their community.

To test the relationship between attitude and knowledge, Pearson's product-moment correlation was used.

The analysis of data was completed using SPSS version 9.0 for PCs. All data were computed in order to obtain descriptive statistics including means, standard deviations, frequency distributions, as well as t-tests, ANOVA, and correlation using Pearson Product Moment (Pedhazur, 1982). An alpha level of 0.05 was selected as the significant level. Correlations were evaluated based on significance and strength of the relationship.

Adjectives to describe the magnitude of correlation included: .99 - .70 = very high; .69 - .50 = substantial; .49 - .30 = moderate; .29 - .10 = low,; and .09 - .01 negligible (Davis, 1971.) Findings were reported in aggregate and no attempt was made to identify individual respondents.

CHAPTER IV

FINDINGS

The purpose of this chapter is to provide a complete discussion of the major findings derived from the mailed questionnaires used in this study. Chapter IV is divided into the following sections: (1) Introduction, (2) Purpose of the Study, (3) Objectives of the Study, (4) Respondents, and (5) Findings.

Purpose of the Study

The purpose of this study was to evaluate the impact of the Forestry Institute for Teachers (FIT) weeklong resident summer workshop on the integration of environmental education materials in K-12 teacher classrooms and on the environmental knowledge and attitudes of selected teachers and their students.

Objectives

The objectives of this study were:

1. To develop a profile of Forestry Institute for Teachers (FIT) participants.
2. To determine frequency of and method of use of environmental education materials provided to teachers by FIT.

3. To determine if perceived barriers exist which prevent teachers from integrating environmental education topics into the curriculum.
4. To identify areas for improving the FIT program
5. To determine what impact FIT had on the environmental knowledge and attitudes of agricultural education teachers who completed FIT and their students when compared to a similar group with no FIT experience.
6. To determine if relationships exist between and among personal of teachers and students concerning environmental literacy.

Respondents

This study involved two groups of participants. Details regarding each of these groups are presented in the following discussion

FIT Workshop Participants

The Largest set of participants consisted of a population of 730 California K-12 teachers who attended a Forestry Institute for Teachers (FIT) professional development workshop offered between 1993 and 1999. The Institute offered three separate weeklong workshops at four different northern California locations each summer beginning in 1993.

Assisted by the administrative staff of the Forestry Institute or Teachers (FIT), the researcher generated a sample of 454 participant names from the FIT participant database. In February 2000, a notification letter was mailed to each sample member one week prior to the mailing of a cover letter and self-administered survey. Approximately three weeks after the first mailing, a second packet containing a revised cover letter, survey, and an incentive were mailed to the non-respondents of the first mailing. A total of thirty-seven packets were returned as unforwardable. These were considered as missing elements and removed from the sample. Two weeks following the second mailing, post cards were mailed as reminders requesting participants to complete and return the surveys. Data were collected and reported on 222 respondents of the possible 417, for a return rate of 53 percent. Ten percent of the non-respondents (20) were contacted by telephone and requested to complete the survey over the telephone. A comparison between the survey respondents and non-respondents yielded no significant differences.

Agriculture Student Participants

Agriculture teachers from twenty California high schools were contacted by telephone to solicit students to participate in the study. Each teacher was mailed a packet containing a cover letter explaining the purpose of the study, instructions for administering the assessment, a teacher knowledge and attitude assessment form and the number of student environmental knowledge and attitude assessment forms corresponding to the number of students in the forestry, natural resource management, or agriscience class.

Two hundred and four assessments were received from ten schools. Ten forms were received from ag teachers and 194 were from students. Seventy-two students of FIT-trained agriculture teachers made up 37.1 percent of the sample while 62.9 percent or 122 were from agriculture programs with non-FIT trained agriculture teachers. The student population was made up of 64.2 percent male and 35.8 percent female. Nearly 40 percent of students indicated living on a farm or ranch or in the country and 60 percent reside in an urban setting.

Findings

FIT Workshop Participants

Objective one was to develop a selected profile of FIT participants. The selected demographic variables used in this study included: gender, age, number of years teaching, education level, subject taught, grade level taught, community size, membership in conservation-type organization, year attended FIT, and location of FIT workshop. Demographic characteristics of FIT participants are presented in Tables 1 and 2. An analysis of the demographic data related to gender of the FIT participants revealed that over 77% of the respondents were female and 22.3% were male. The level of education completed by the respondents varied from an Associate's degree to an advanced graduate degree. Over half of the respondents (53.0%) had earned a Bachelor's degree while 43.8% earned a Master's degree, 5 (2.3%) held a Ed.D or Ph.D Degree and 2 respondents (0.9%) indicated having an Associate's degree.

In response to questions to determine grade levels taught there were 212 responses. By grade level, there were 62 (29.2%) K-3 teachers, 67 (31.6%) 4-6 grade teachers, 38 (17.9%) 7-8 grade teachers, 37 (17.5%) 9-12 grade teachers and 8 (3.8%) reported not teaching at the time of completing the questionnaire. Nine participants (4.2%) reported teaching secondary agriculture.

Respondents were asked to identify the size of community where they teach. Choices were: a) metropolitan areas (population of 100,000 or greater); b) urban areas (population of 50,000 – 99,999); c) suburban areas (population of 15,000 – 49,999); d) town (population of less than 15,000); e) rural area.. Nearly one-third (32.9%) reported teaching in metropolitan areas, 19.2% were from urban areas, 16.0% were from suburban areas, 8.9% reported their community size as a town while 23.0% came from rural areas.

The participants were asked about their membership in conservation-type organizations. Less than half (47%) claimed belonging to such organizations. The distribution of those most frequently listed was Sierra Club (26.5%), Nature Conservancy (24 %) and Audubon (14%).

Participants were asked to report what year they attended a FIT summer workshop. Of the 202 responding to this question, 43 (21.3%) were graduates of a session conducted in 1999. For sessions conducted during the summer of 1998, 40 (19.8%) responded. For workshops conducted in 1997 there were 26 respondents (12.9%). Twenty-eight respondents (12.6%) attended the 1995 summer sessions, while another 28 (12.6%) were from 1994. Fifteen (7.4%) respondents indicated having attended a FIT workshop in the summer of 1993.

Respondents were requested to identify the location of the summer workshop they attended. Ninety-five (45.5%) reported attending a session at the University of California Forestry Camp in Quincy, 64 (30.6%) attended a workshop at Humboldt State University, 27 (12.9%) attended Camp Latieze in Shasta County, and 23 (11.0%) responded they attended a session at the Whiskeytown Environmental School.

Table 1

Descriptive Information of FIT Participants from Usable Surveys

Descriptive item	Item descriptors	Frequency	Percent
Gender	Female	171	77.7
	Male	49	22.3
Education Level	AA/AS	2	0.9
	BA/BS	115	53.0
	MA/MS	95	43.8
	EdD/PhD	5	2.3
Grade level teaching	K-3	62	29.2
	4-6	67	31.6
	7-8	38	17.9
	9-12	37	17.5
	Not currently teaching	8	3.8
Teaching Agriculture	Yes	9	4.1
	No		
Community Size	Metropolitan	70	32.9
	Urban	41	19.2
	Suburban	34	16.0
	Town	19	8.9
	Rural	49	23.0
Conservation organization membership	Yes	101	47.0
	No	114	53.0
Year attended FIT	1999	43	21.3
	1998	40	19.8
	1997	26	12.9
	1996	28	13.9
	1995	28	13.9
	1994	21	10.9
	1993	15	7.4
Location of workshop	Camp Latieze Shasta County	27	12.9
	Humboldt State University	64	30.6
	U.C. Forestry Camp, Quincy	95	45.5
	Whiskeytown Environ. Center	23	11.0

The age range of respondents was 25 to 68 with the mean age 46.62 (Table 2). The range of years teaching experience for respondents was 1 to 40 years with the mean years of teaching experience being 16.21.

Table 2

Selected Demographic Characteristics of FIT Participants

Descriptive item	M	SD
Age	46.62	8.80
Years teaching experience	16.21	8.92

Frequency and Method of Use of FIT Materials

As stated in objective two, this research sought to determine frequency and methods of use of environmental education materials provided to teachers by FIT. Respondents' were requested to complete eight open-ended statements and three forced-response statements. Table 3 was constructed to illustrate the frequency of use of FIT activities in the respondents' classroom.

Table 3

Nature and Extent of Utilization of FIT Materials and Activities by Participants

Comparison Factor	M	SD	n
Number of times FIT activities used	13.28	5.43	131
Number of different FIT activities	9.35	8.07	183
Number of classes taught using FIT materials	3.72	8.12	190
Number of FIT activities used with students	13.06	24.57	181
Amount of instructional time spend with students on FIT activity (minutes)	28.10	29.84	55
Number of students using FIT activities [a]	77.86	143.41	206
Number times used curriculum unit developed at FIT workshop	3.14	3.28	147
Number of daily lessons taught using	12.69	26.37	191

Note. [a] Range: 1-1502

As reported, the respondents indicated using FIT material an average of 13.28 times per year with their classes while using 9.35 different activities. The reported mean number of classes taught was 3.72. Teachers reported the mean number of activities used with students in a year was 13.06 and that they spent an average of 28 minutes on each activity. The mean number of students exposed to FIT activities was 77.86 with a range of 1 to 1,505. Teachers reported using their self-developed curriculum units a mean of 3.14 times. The mean number of daily lessons taught using FIT activities was 12.69. It was noted that there were fewer numerical responses provided by respondents to this section of the questionnaire. Responses such as "frequently", "varies", and "depends" were provided but not included in this analysis.

A break down of how teachers of different grade levels utilized the materials is presented in Table 4. Means and standard deviations are represented. High school teachers reported using FIT materials and activities with more frequency, (M = 7.59, SD = 6.59) than other grade level groups while teachers in grade 4-6 report the lowest frequency of usage (M = 4.63, SD = 5.39) However, high school teachers use fewer different activities than elementary teachers. Teachers in grade 4-6 spent more instructional time on FIT activities than teachers of other grade levels. The 7-8 grade teachers taught the greatest number of students followed by the high school teachers.

Table 4

Means and Standard Deviations of Frequency of Use of FIT Activities by Grade Level

Frequency of Activity	K-3			4-6			7-8			9-12			Total
	M	SD	n	M	SD	n	M	SD	n	M	SD	n	N
Number of times FIT activities are used with students	6.49	5.42	35	5.63	5.39	41	5.28	4.13	26	7.59	6.59	22	124
Number of different FIT activities	11.74	8.69	54	8.98	7.67	54	8.32	6.74	35	6.46	4.80	28	171
Number of classes taught using FIT materials	3.25	6.50	56	3.65	5.43	56	3.37	3.73	37	2.72	1.63	32	181
Number of FIT activities used with students	14.74	12.94	53	10.70	8.79	54	18.26	50.20	35	8.00	7.18	27	169
Amount of instructional time spend with students on FIT activity (minutes)	28.13	21.93	15	35.50	38.29	19	22.64	26.18	15	12.80	15.72	5	54
Number of students using FIT activities [a]	37.52	76.96	61	59.69	79.18	63	176.03	282.07	38	76.53	57.91	34	196
Number times used curriculum unit developed at FIT workshop	3.24	2.77	49	2.96	3.17	35	3.36	4.11	33	2.97	3.34	33	175

Table 4 (Continued)

Statement	K-3			4-6			7-8			9-12			Total
	M	SD	n	M	SD	n	M	SD	n	M	SD	n	N
Number of daily lessons taught using FIT materials	13.36	13.08	42	10.20	10.85	40	18.84	53.30	32	7.88	6.43	26	140

Note. [a] Range: 1-1502

A comparison of how teachers differ in their usage of activities by grade level was examined using analysis of variance, a statistical method to test for significant differences among groups. A one way ANOVA would determine if there is a relationship between a dependent variable and an independent variable (Keppel, 1991). The independent variable was the teacher characteristic and the dependent variable was the reported use or frequency.

Table 5

ANOVA of Response of Number of Different FIT Activities Used by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	655.926	4	163.981	3.002*	a > b
Within Groups	9449.630	173	54.622		
Total	10105.556	177			

Note. *p. > 0.05 a = K-3; b = 9-12

ANOVA was used to compare group mean differences of teachers' frequency of use by the demographic characteristic, grade level taught. Results of the ANOVA of the number of different activities used by teachers in their classrooms are presented in Table 5. The calculated F value of 3.002 (degrees of freedom of 4 and 173) was significant at $\alpha = .05$ level of significance (F_{cv} (4,173) = 2.37 < F_{cal} 3.002). A Tukey post hoc comparison suggested that the teachers of K-3 are statistically different than 9-12 grade teachers in regards to frequency of use of FIT materials and activities.

Table 6

ANOVA of Response of Number of Students Taught by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	444087.661	4	111021.968	5.964*	c > a,b,d
Within Groups	3685757.8	198	18614.939		
Total	4129845.7	202			

Note. *p. >0.001 a = K-3; b = 4-6; c = 7-8; d = 9-12

Table 6 was developed to illustrate the analysis of variance conducted to determine the difference between grade level groupings of teachers and the number of students taught using FIT materials. The calculated F value of 5.964 exceeded the table or critical value (2.37) and was found to be significant at the $\alpha = .05$ level of significance (F_{cv} (4,198) = 2.37 < F_{cal} 5.964). A post hoc comparison revealed that junior high (7-8) grade teachers were significantly different than all three other grade level groups.

Three fixed-response questions in Section One of the questionnaire were asked to determine the frequency of use of outdoor activities since attending FIT, the number of environmentally related field trips conducted with student since attending FIT, and the number of lessons taught incorporating environmental education.

Table 7 illustrates findings of the three forced-response questions relating to impact of FIT on teaching activities. Over two-thirds (67.5%) of the respondents claimed the number of outdoor activities used in their teaching had increased while 2.9 percent of the respondents claimed a decrease. Those indicating an effect of “no change” in the number of outdoor activities were 29.6 percent.

Table 7

Frequency of Use of FIT Activities in the Classroom

Since attending FIT	n	Frequency	Percent
Use of outdoor activities	206		
Increased		139	67.5
Decreased		6	2.9
No change		61	29.6
Number of environmentally- related field trips incorporated into teaching	195		
Increased		105	53.8
Decreased		4	2.1
No change		86	44.1
Number of lessons taught that integrates environmental education	190		
Increased		157	82.2
Decreased		3	1.6
No change		31	16.2

According to the teachers, over half said their number of environmentally related field trips had increased while 44.1 percent indicated no change since attending FIT and 2.1 percent marked a decrease.

Of the 190 teachers responding to number of lessons taught incorporating environmental education, 157 (82.2%) indicated an increase, 3 teachers (1.6%) a decrease, and 31 (16.2 %) indicated no change in the number of lessons.

Method of Use of FIT Materials

Section two of the FIT questionnaire was designed determine the method of use of materials provided by the FIT program and how teachers integrated environmental education topics into their curriculum. The information obtained from this section of the instrument was analyzed based on a six-point "Likert-type" scale. The response categories in each of these areas was assigned the following numerical values: strongly agree = 2; agree = 1; neither agree or disagree = 0; disagree = -1; strongly disagree = -2; .

Real limits were set at 2.0 to 1.50 for strongly agree; 1.49 to 0.50 for agree; 0.49 to - 0.49 for neither agree nor disagree; -0.50 to -1.49 for disagree; and -1.50 to -2.00 for strongly disagree.

Table 8 summarizes the respondents' level of agreement to statements regarding how teachers use FIT materials. Respondents were asked to rate their level of agreement on eight "Likert-type" statements to determine how teachers use FIT activities in their teaching.

The first statement dealt with using materials to include concepts about forest ecology and the environment into their curriculum. Teachers were in agreement (M = 1.43, SD = 0.68). Of the 219 responding to this statement, 201 (96.2%) indicated they agreed or strongly agreed, 2 (1.0%) disagreed, 2 (1.0%) strongly disagreed, and another 4 (1.9%) did not have an opinion either way.

The second statement asked teachers to indicate their level of agreement with using FIT activities to provide students with "opportunities for learning that is interesting, useful and instructionally sound." Two hundred and four (97.6%) of the 209 responding were in agreement or strong agreement with this statement (M = 1.53, SD = 0.60). A total of two respondents (1.0%) were in disagreement, and 3 (1.4%) neither agreed nor disagreed.

Statement number three inquired of teachers using the materials to meet science requirements. Of the 201 respondents to this statement, 162 (80.6%) were in agreement (M = 1.05, SD = 0.85), a combined total of 8 (4.0%) disagreed, and 31(15.4%) neither agreed nor disagreed.

In regards to statement number four, "using FIT materials to meet social studies requirements," 91 teachers (51.7%) agreed with statement as to how they use the materials (M = 0.50, SD = 0.94), 63 (35.8%) neither agreed nor disagreed, and 22 (12.5%) disagreed.

Teachers were not likely to agree (M = 0.56, SD = 1.01) about using FIT materials as a recreational activity. Of the 192 respondents to this statement, 117 (54.8%) agreed, 45 (23.4%) neither agreed nor disagreed, and 30 (15.7%) combined to disagree with the statement.

When asked about using FIT materials to meet requirements of a course of study, of 177 respondents, 118 (66.7%) either agreed or strongly agreed to its use (M = 0.73, SD = 0.99), 41 (23.2%) neither agreed nor disagreed, and 18 (10.2%) disagreed or strongly disagreed.

Two negatively worded statements were included in this section. In response to the statement "I do not care for the materials and do not plan to use them," teachers responded in disagreement or strong disagreement (M = -1.70, SD = 0.62) 189 of 195 (96.9%). Three teachers (1.5%) agreed with the statement, one (0.5%0 strongly agreed, while 2 (1.0%) neither agreed nor disagreed.

Likewise for the statement “I have no plans to use the materials in the future,” the majority of the respondents, 182 of 188 (96.8%) disagreed (M = -1.69, SD = 0.68). Only 4 (2.1%) combined in agreement, and 2 (1.1%) neither agreed nor disagreed.

Table 8

Respondents Extent of Agreement with Uses of FIT Activities

Uses of Activities	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD	Response	Total
Able to include concepts about forest ecology and EE into curriculum	104	49.8	97	46.4	4	1.9	2	0.9	2	0.9	1.43	0.68	Agree	209
Opportunities for learning that is interesting, use-ful and sound	118	56.5	86	41.1	3	1.4	1	0.5	1	0.5	1.53	0.60	Strongly Agree	209
Meet science requirements	62	30.8	100	49.8	31	15.4	4	2.0	4	2.0	1.05	0.85	Agree	201
As a recreational activity	28	14.6	89	46.4	45	23.4	22	11.5	8	4.2	0.57	1.01	Agree	192
Requirements of course of study	37	20.9	81	45.8	41	23.2	11	6.2	7	4.0	0.73	0.99	Agree	177
Meet social studies requirements	24	13.6	66	38.1	63	35.8	17	9.7	5	2.8	0.50	0.94	Agree	176

Table 8 (Continued)

Use of Activities	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total
Do not care for materials	1	0.5	3	1.5	2	1.0	41	21.0	148	75.9	-1.70	0.62	Strongly Disagree	195
No plans to use it	3	1.6	2	0.5	2	1.1	40	21.3	142	75.5	-1.69	0.68	Strongly Disagree	188

Comparisons between male and female participants' agreement with method of use statements using t-tests revealed statistically significant differences on two of eight statements: To meet science requirements (t = -2.92, p. >0.05), and to meet social science requirements (t = -2.08, p. >0.05). This suggests that female teachers were more likely to use FIT materials to meet requirements in science and social studies than were male teachers. Table 9 illustrates the findings of the comparison.

Table 9

T-Test Comparison of Respondents' Extent of Agreement of Use of FIT Activities in the Classroom Based on Gender

Utilization	Gender	n	M[a]	SD	t
Able to include concepts about forest ecology and EE into curriculum	Male	49	5.14	1.06	-.931
	Female	168	5.30	1.07	
Opportunities for learning in that is interesting, useful and sound	Male	49	5.31	1.02	-.575
	Female	167	5.40	0.99	
Meet science requirements	Male	48	4.37	1.21	-2.92*
	Female	165	4.96	1.23	
Meet social studies requirements	Male	47	3.43	1.61	-2.08*
	Female	157	3.96	1.56	
As a recreational activity	Male	47	4.13	1.47	-.420
	Female	166	4.23	1.43	
Requirements of course of study	Male	47	3.32	1.37	1.073
	Female	165	4.06	1.73	
Do not care for materials	Male	47	2.38	0.92	1.710
	Female	165	2.14	0.61	

Table 9 (Continued)

Scale	Gender	n	M[a]	SD	t
No plans to use it	Male	45	2.40	1.14	1.651
	Female	162	2.11	0.56	

*p> 0.05

Several comparisons were made to determine if teachers differed in their responses to use of FIT materials using reported demographic characteristics. T-tests were used on two group means. Analysis of variance was used to make comparisons on more than two groups.

Group means by FIT workshop location (independent variable) was measured against the dependent variable, use of FIT materials to meet social studies requirements (Table 10).

Table 10

ANOVA of Use of FIT Activities to Meet Science Requirements by Location of FIT Workshop Attended

Source	SS	df	MS	F	Tukey HSD
Between Groups	13.884	3	4.628	5.448*	W>H
Within Groups	137.616	162	.849		
Total	151.500	165			

Note. *p. >0.001 H = Humboldt; W= Whiskeytown

The calculated F value of 5.448 was significant at $\alpha = .001$ level of significance (F_{cv} (3, 162) = 5.42 < F_{cal} 5.448) indicating that teachers of attending different FIT workshop locations were different in their use of FIT materials to meet social studies requirements. A Tukey HSD post comparison found that teachers' who reported attending a workshop at the Whiskeytown site were significantly different than teachers from the Humboldt workshop site.

Table 11

ANOVA of Use of FIT Materials as an Opportunity for Learning by Location of FIT Workshop Attended

Source	SS	df	MS	F	Tukey HSD
Between Groups	2.949	3	.983	2.713*	L > H
Within Groups	70.304	194	.362		
Total	73.253	197			

Note. *p. >0.05 H = Humboldt; L =Latieze

Group means by FIT workshop location (independent variable) was measured against the dependent variable "use of FIT materials to provide opportunities for learning that is interesting, useful, and sound." (Table 11). The calculated F value of 2.713 was significant at $\alpha = .05$ level of significance (F_{cv} (3, 194) = 2.60 < F_{cal} 2.713) indicating that teachers attending different FIT workshop locations were different in their "use of FIT materials to provide opportunities for learning that is interesting, useful and sound." A Tukey HSD post comparison found that teachers' who reported attending a workshop at Whiskeytown were significantly different than teachers attending the Humboldt workshops.

Table 12

ANOVA of Use of FIT Materials to Meet Social Studies Requirements by FIT Workshop Location

Source	SS	df	MS	F	Tukey HSD
Between Groups	13.884	3	4.628	5.448*	W>H
Within Groups	137.616	162	0.849		
Total	151.500	165			

*p. >0.01

Participants' level of agreement with use of Fit materials to meet social studies requirements varied by workshop location was analyzed using ANOVA (Table 12). It was found that teachers attending the Whiskeytown location were significantly different from teachers who attended a Humboldt workshop. The calculated f value was 5.448 and was significant at $\alpha = .01$ level of significance (F_{cv} (3, 165) = 3.95 < F_{cal} 5.448).

Table 13

ANOVA of Use of FIT Activities to Meet Science Requirements by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	14.954	4	3.738	5.654*	a > b
Within Groups	125.631	190	.661		
Total	140.585	194			

Note. *p. >0.001 a = K-3; b = 9-12

FIT workshop participants were found to differ by the grade level taught and their level of agreement to use FIT materials to meet science requirements (Table 13). Through the use of ANOVA, a significant difference was found to exist. The calculated F value of

5.654 was significant at $\alpha = .001$ level of significance (F_{cv} (4,190) = 4.62 < F_{cal} 5.564). A Tukey post hoc found that teachers of K-3 are significantly different than teachers of 9-12 (Table 13) in regards to using FIT materials to meet science requirements.

Table 14

ANOVA of Use of FIT Materials to Meet Social Studies Requirements by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	10.906	4	2.726	3.238*	a>b
Within Groups	139.773	166	.842		
Total	150.678	170			

Note. *p. >0.05 a = K-3; b = 9-12

Table 14 displays the results of analysis of variance between groups of teachers to compare their use of FIT materials to meet social science requirements by the grade level that they taught. The calculated F value of 3.238 was significant at $\alpha = .05$ level of significance (F_{cv} (4, 166) = 2.45 < F_{cal} 3.238). Post hoc comparison found K-3 grade level teachers to be significantly different than 9-12 teachers in their use of FIT materials to meet social studies requirements.

Table 15

ANOVA of Use of FIT Activities for Learning that is Interesting, Useful, and Sound by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	12.201	4	3.050	3.384*	a > b,c,d
Within Groups	178.478	198	.901		
Total	190.680	202			

Note. *p. >0.05 a = K-3; b = 4-6; c = 7-8; d = 9-12

When a comparison of teachers' by grade level on the variable "the use of FIT activities for learning that is interesting, useful and instructionally sound," teachers differed significantly. The calculated F value of 3.384 is statistically significant at α = 0.05 level of significance (F_{cv}(4, 198) = 3.384 < F_{cal} 2.37 (Table 15). Post hoc comparison revealed teachers in grades K-3 were significantly different than the other grade level groups.

Table 16

ANOVA of Use of FIT Materials to Meet Science Requirements by Education Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	7.111	3	2.370	2.715*	MS>BS, PhD
Within Groups	148.389	170	0.873		
Total	155.500	173			

*p. >0.05

To determine if the teachers with varying education levels differed in their use of FIT activities, analysis of variance was used. A one way ANOVA was used to compare group mean differences of teachers' use of FIT activities to meet science requirements by education level of the teacher. Results of the ANOVA are presented in Table 16. The calculated F value of 3.211 was significant at $\alpha = .05$ level of significance (F_{cv} (3, 207) = 2.60 < F_{cal} 3.211) indicating that teachers of varying education levels were different in their use of FIT materials to meet science requirements. A Tukey HSD post hoc comparison found that teachers with a Masters Degree were significantly different from teachers with a B.S. Degree or Ph.D. in regards to using FIT materials to meet science requirements.

Further analysis of the grade level taught independent variable found that teachers use of FIT materials as a recreational activity (F value of .967), showed no significance when compared to the critical value (Table 17).

Table 17

ANOVA of Use of FIT Activities as a Recreational Activity by Grade Level

Source	SS	df	MS	F
Between Groups	7.578	4	1.894	.967
Within Groups	382.1771	195	1.960	
Total	389.755	199		

For the dependent variable statement "requirements of a course of study", the calculated value (F value of 1.12), failed to beat the critical table value. Therefore, there was no significant difference found in between groups (Table 18).

Table 18

ANOVA of Use of FIT Activities as Requirements of Course of Study by Grade Level

Source	SS	df	MS	F
Between Groups	13.577	4	3.394	1.12
Within Groups	501.951	194	2.587	
Total	515.528	198		

Table 19 represents the findings of comparisons made between the groups of respondents based on grade level toward the negatively worded statement of "not caring to use the material" (F value of .964). As the calculated F value did not exceed the critical table value $F_{cv}(4, 195) = 2.35$, $p. > 0.05$), no significant difference was found to exist between the groups based on their response to the statement.

Table 19

ANOVA of Teachers' Not Caring to Use FIT Materials by Grade Level

Source	SS	df	MS	F
Between Groups	1.921	4	.480	.964
Within Groups	382.1771	195	1.960	
Total	389.755	199		

Likewise similar findings for the dependent variable statement, "no plans to use FIT materials" (F value of .734) was derived from analysis when mean group responses of teachers based on their grade level was compared (Table 20).

Table 20

ANOVA of Teacher's Response of No Plans to Use FIT Materials by Grade Level

Source	SS	df	MS	F
Between Groups	1.632	4	.408	.734
Within Groups	105.053	189	.556	
Total	106.686	193		

The final question of section two of the FIT workshop questionnaire asked for respondents to select one of three statements that best described the teachers' approach to using FIT activities in the classroom. Results are displayed in Table 21.

Table 21

Approach to Using FIT Activities in the Classroom (N=211)

Approach	Distribution	
	f	%
As the basis for course of study or as basis for one or more instructional units taught	65	30.8
Select FIT activities where appropriate and use them as part of teaching	139	65.9
Do not use the FIT activities in my teaching	7	3.3

Sixty-five (30.8%) respondents indicated using FIT activities as the basis for a course of study or as a basis for one or more instructional units they teach. One hundred and thirty-nine teachers (65.9%) selected FIT activities where appropriate and used them as part of their teaching. Only seven teachers (3.3%) indicated they did not use the FIT activities in their teaching.

A Pearson Product Moment correlation was used to determine if a relationship existed between specific demographic characteristics and how FIT materials are used to integrate environmental education materials into curriculum (Table 22).

Table 22

Correlation Between Gender and Use of FIT Materials in the Classroom

Variables	Correlation
Gender / Meet science requirements	.195**
Gender / Meet social studies requirements	.142*
Gender / Do not care for materials	-.147*
Gender / No plans to use FIT materials	-.164*

Notes. *p. > 0.05 level (2-tailed) **p. > 0.01 (2 tailed)

Table 22 shows a statistically significant though positive low correlation between gender and use of materials to meet science requirements (r = .195) and to meet social studies requirements (r = .142). Additionally, a statistically significant negative low correlation was found between gender and statements of "Do not care for materials" (r = -.147) and "No plans to use the materials" (r = -.164).

Integrating Environmental Education into Classroom Curriculum

The third section of the survey instrument sought to determine how teachers perceived integration of the environmental education in their curriculum (Table 23). Respondents were asked to rate their level of agreement on nine statements using a six point "Likert-type" scale.

Responding to the first question, a very strong majority, 200 of 213 respondents (93.4%) indicated they were in agreement or strong agreement that after attending the FIT workshop, they felt prepared to integrate environmental education materials into their classroom lessons. Eleven (5.2%) respondents neither agreed nor disagreed, 2 (0.9%) strongly disagreed

The second statement focused on the perceived usefulness of the individual curriculum unit (developed by the participant during the FIT workshop) for integrating environmental education into their classroom lessons. A strong majority of the respondents (180 of 209 for 86.2%) agreed or strongly agreed with this statement. Respondents expressing an opinion of neither agreeing nor disagreeing accounted for 10.0 percent (21 of 209), and 8 (3.8%) disagreed or strongly disagreed.

An overwhelming majority of teachers (205 of 210 for 97.6%) were in agreement that materials they received from FIT have been useful in integrating environmental education into their curriculum. Two respondents (1.0%) strongly disagreed, and 3 (1.4%) neither agreed nor disagreed.

Did teachers attending FIT have any impact on other teachers in their school integrating environmental education into their curriculum? Ninety-three teachers (49.0%) agreed that their attending FIT had an impact on other teachers' integration of environmental education materials, while 39 (20.5%) disagreed with the statement. Thirty percent (58 of 210) neither agreed nor disagreed.

A negatively worded statement asked respondents' level of agreement with the perception that the material presented at FIT was not what they were looking for in environmental education materials. Of the 209 respondents to this statement, 191 disagreed or strongly disagreed (91.4%). A total of 7 (3.3%) were in agreement with the statement and 11 (5.2%) neither agreed nor disagreed.

Respondents report that materials presented at FIT were useful for implementing environmental education into their lessons (209 of 212 for 98.6%). Two participants (0.9%) strongly disagreed, and 1 (0.5%) neither agreed nor disagreed.

When asked of respondents' perception of material presented at FIT as not appropriate to teachers'grade level and subject area, 182 (88.0%) disagreed, 15 (7.2%) agreed, and 10 (4.78%) neither agreed nor disagreed.

Teachers did strongly agree or agree (206 of 215, 95.8%) that material presented at FIT was at the appropriate level for their understanding. Disagreeing respondents accounted for 2.8 percent (6 of 215) and those electing to neither agree nor disagree (3 of 215) accounted for 1.4 percent.

To the statement "I did not have enough of a background in environmental education to understand the concepts being presented", 195 (92.9%) strongly disagreed or disagreed, 10 (4.8%) agreed or strongly agreed, and 5 (2.4%) neither agreed nor disagreed. Results are depicted in Table 23.

Table 23

FIT Respondents' Perceptions of Integration of Environmental Education into Classroom Curriculum

Integration	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total N	%
Feel prepared to integrate EE into my lessons	89	42.2	108	51.2	10	4.7	0	0	2	0.9	1.14	0.82	Agree	209	100
Curriculum unit was useful for integrating EE into lessons	68	32.7	107	51.4	21	10.1	3	1.4	4	1.9	1.48	0.63	Agree	210	100
Material received from FIT was useful in integrating EE into lessons	107	50.7	94	44.5	3	1.4	0	0	2	0.9	0.38	1.05	Neither Agree/ Disagree	190	100
Other teachers have integrated EE into their lessons since I attended FIT	25	11.9	65	31	57	27.1	31	14.8	8	3.8	-1.47	0.82	Disagree	209	100

Table 23 (Continued)

Statement	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total N	%
Material was not what I was looking for in EE materials	4	1.9	3	1.4	11	5.2	62	29.5	125	59.5	-1.47	0.82	Disagree	212	100
Materials presented was useful for implementing EE into lessons	109	51.9	95	45.2	1	0.5	0	0	2	1.0	1.40	0.72	Agree	210	100
Material presented at FIT was not appropriate for my grade level and subject area	3	1.4	12	5.7	10	4.7	66	31.3	112	53.1	-1.35	0.92	Disagree	207	100
Material presented at FIT was at the appropriate level for my under-standing	103	48.4	99	46.5	3	1.4	3	1.4	3	1.4	1.40	0.72	Agree	215	100

Table 23 (Continued)

Statement	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total N	%
I did not have enough of a background in EE to understand the concepts being presented	5	2.4	5	2.4	5	2.4	60	28.6	135	64.3	-1.50	0.85	Strongly Disagree	210	100

An analysis of variance was conducted to determine if teachers by grade level (independent variable) differed significantly when responding extent of agreement of felt prepared to integrate environmental education (EE) into their lessons (dependent variable). The calculated F value of 3.016 was statistically significant at the $\alpha = 0.05$ level of significance ($F_{cv}(4, 202) = 2.37 < F_{cal}\, 3.016$ (Table 24). Post hoc comparison found teachers from grades 4-6 to be significantly different regarding level of feeling prepared to integrate environmental education into their class curriculum than teachers from grades 9-12.

Table 24

ANOVA of Extent of Agreement of Prepared to Integrate Environmental Education by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	5.126	4	1.282	3.016*	a>b
Within Groups	85.830	202	0.425		
Total	90.957	206			

Note. *p. >0.05 a = 4-6, b = 7-8

Teachers in grades 4-6 were found to be significantly different than teachers in all other reported grade levels when compared based on the extent of agreement to the usefulness of curriculum units prepared at the FIT workshop. Table 25 displays the results of the ANOVA and post hoc comparison.

Table 25

ANOVA of Extent of Agreement of Usefulness of Curriculum Unit by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	13.109	4	3.277	5.669*	b>c,d,a
Within Groups	114.458	198	0.578		
Total	127.567	202			

Note. *p. >0.05 a = K-3, b = 4-6, c = 7-8, d= 9-12

The calculated F value of 5.669 was statistically significant at the $\alpha = 0.001$ level of significance ($F_{cv}(4,198) = 4.62 < F_{cal}$ 5.669 (Table 25). The findings suggest that 4-6 grade level teachers report higher level of usefulness of curriculum units than other grad level groups of teachers that attended the workshops.

Table 26

ANOVA of Extent of Agreement of Material Presented at FIT Useful to Integrating Environmental Education by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	4.445	4	1.111	3.140*	a>b
Within Groups	70.794	200	0.354		
Total	75.239	204			

Note. *p. >0.05 a = 4-6; b = 9-12

To the statement "The material presented at FIT was useful for implementing environmental education into my lessons," an ANOVA found teachers in 4-6 grade differed significantly from teachers in grade 9-12. The calculated F value of 3.140 was statistically significant at the $\alpha = 0.05$ level of significance ($F_{cv}(4, 200) = 2.37 < F_{cal}$

3.140 (Table 26). A Tukey post hoc comparison revealed the elementary grade teachers in 4-6 to have a higher level of agreement with the statement than the secondary teachers in grades 9-12.

Table 27

Respondents Completing and Returning Self-Developed Curriculum Units

Response	Distribution	
	f	%
Yes	132	62.3
No	80	37.7
Total	211	100.0

To the question "Did you complete and return your curriculum unit you developed at the FIT workshop?" (Table 27) the majority of teachers (62.3%) responded positively while 37.7 percent indicated they failed to return their curriculum units. As a follow up, respondents were asked to clarify their negative responses. The majority cited a lack of time as the reason for not completing or returning their units.

Teachers in grades 7-8 were found to be significantly different from teachers in grades 4-6 in regards to completing and returning their curriculum units. This suggested that a higher number of 7-8 grade teachers were found to have completed and returned their curriculum units than 4-6 grade groups. The calculated F value of 2.540 was statistically significant at the $\alpha = 0.05$ level of significance ($F_{cv}(4, 200) = 2.37 < F_{cal}$ 2.540). Table 28 depicts the findings of this examination.

Table 28

ANOVA of Response by Grade Level to Question of Returning of Curriculum Unit

Source	SS	df	MS	F	Tukey HSD
Between Groups	2.299	4	0.575	2.540*	b>a
Within Groups	45.262	200	0.226		
Total	47.561	204			

Note. *p. >0.05 a = 4-6; b = 7-8

Perceived Barriers to Integrating Environmental Education

The third objective of the study sought to identify what perceived barriers existed that prevent teachers from integrating environmental education topics into their classroom curriculum. To satisfy this objective, participants were asked to indicate their level of agreement to fourteen statements using a "Likert-type" scale ranging from "strongly agree" to "strongly disagree".

Teachers rated "a lack of school time" as the most often agreed upon barrier (M = .29, SD = 1.25) as indicated by slightly over half (54.6%) of the 205 respondents marked "agree" or "strongly agree" to this statement. Seventy teachers (34.2%) "disagreed" or "strongly disagreed," 23 (11.2%) checked "neither agree nor disagree."

The second highest rated barrier indicated by the frequency of responses to "agree" or "strongly agree" was "lack of preparation time" (M =.01, SD = 1.26). Of the 210 respondents, 93 (44.3%) were in agreement as compared to 89 (42.4%) in disagreement. Respondents who neither agreed nor disagreed (28) were 13.3 percent of the group.

A lack of funding (M = -.27, SD =1.27) was perceived to be a barrier by 37.0 percent of the teachers' (75), while 52.7 percent (107) did not agree. Those who found themselves in the middle (neither agree nor disagree) accounted for 10.3 percent (21) of the group.

Slightly over half of the respondents (116 of 204 for 56.9%) indicated a lack of administrative support was not a barrier to integrating environmental education into their classroom curriculum while 21.6 percent did perceive it as a barrier. The same number (44 or 21.6%) of teachers were indecisive and neither agreed nor disagreed.

The majority of respondents did not find a lack of accessible natural environments as a barrier (M = -.77, SD = 1.23). Of the 206 respondents, 144 (69.9%) disagreed compared to 48 (23.3%) which were in agreement. Teachers who neither agreed nor disagreed (14 or 6.8%) accounted for a small percentage.

The majority of teachers reported "a lack of community interest," not to be a barrier (M = -.96, SD = .98). Of the 208 respondents, 154 (74.0%) disagreed or strongly disagreed, while 18 (8.7%) indicated that this was a barrier. Teachers that neither agreed nor disagreed (36 of 208) made up 7.3% of the group.

Class size was not a barrier according (M = -.96, SD = 1.01) to 160 of 206 (77.6%) teachers, while 24 (11.%) found class size to be a barrier. Twenty-two (10.7%) of the respondents indicated no agreement or disagreement.

Teachers did not agree that their class curriculum had no connection to environmental education (M = -1.04, SD = 1.09). The majority (170 of 214 for 79.5%) disagreed. There were 32 teachers that indicated a barrier existed (14.9%), and 12 (5.6%) indicated "neither agree nor disagree" with the statement.

A lack of follow-up by a FIT coordinator was not a barrier (M = -1.04, SD = .88) as perceived by 160 of 207 (77.3%) respondents. While 11 (5.3%) teachers said it was a barrier, 36 (17.4%) indicated neither agreement nor disagreement.

A majority of teachers (178 of 207, 86.0%) did not agree with the statement "Environmental education is not relevant to what I teach" as a barrier to implementing environmental education into their existing curriculum (M = -1.23, SD = .90). Fifteen teachers (7.3%) found it was a barrier, and 14 (6.8%) did not agree or disagree with the statement.

To 87.6% of the respondents (182 of 208), a lack of natural science knowledge was not a barrier to implementing environmental education (M = -1.25, SD = .83). Thirteen teachers (6.3%) did find it a barrier, and 13 teachers (6.3%) did not agree nor disagree.

The majority of FIT participants (89.2%) did not find a failure of previous lessons to be a barrier to implementing environmental education into their classrooms (M = -1.30, SD = .72). Five teachers (2.5%) did indicate this was barrier while 17 (8.4%) were undecided (neither agreed nor disagreed).

A lack of student interest was not perceived to be a barrier (M = -1.42, SD = .75) as indicated by 191 of 207 (92.2%) respondents, while 8 teachers (3.9%) agreed and another 8 (3.9%) did not agree nor disagree.

The final barrier statement dealt with a lack of personal interest of the teacher (M = -1.57, SD = .69). Of the 209 respondents, 198 disagreed or strongly disagreed (94.8%), 5 (2.4%) agreed, and 6 (2.9%) were undecided (neither agree nor disagree). The findings of the barriers are summarized in Table 29.

Table 29

Means and Standard Deviations of FIT Respondents Perceptions of Barriers to Integrating Environmental Education

Barrier	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total N
Lack of preparation time	25	11.5	68	31.3	28	12.9	6	29.0	26	12.0	1.43	1.27	Agree	210
Lack of school time	34	15.7	78	35.9	23	10.6	53	24.4	17	7.8	0.29	1.25	Neither Agree Disagree	205
Lack of funding	15	7.0	60	28.2	21	9.9	69	32.4	38	17.8	-0.27	1.27	Neither Agree Disagree	203
Lack of administrative support	19	8.8	21	9.8	44	20.5	63	29.3	53	24.7	-0.52	1.26	Disagree	204
Lack of accessible natural environments	9	4.2	39	18.1	14	6.5	73	34.0	71	33.0	-0.77	1.23	Disagree	206
Lack of community interest	5	2.3	11	5.1	36	16.7	86	39.8	68	31.5	-0.96	0.98	Disagree	208
Class size is too large	5	2.3	16	7.4	22	10.1	93	42.9	67	30.9	-0.96	1.01	Disagree	206

Table 29 (Continued)

Barrier	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total N
Lack of follow-up from FIT coordinators	2	0.9	9	4.2	36	16.7	91	42.1	69	31.9	-1.04	0.88	Disagree	207
Class curriculum has no connection to environmental education.	5	2.3	21	9.4	12	5.4	81	37.7	89	41.4	-1.04	1.09	Disagree	214
Environmental education topics are not relevant to what I teach.	2	0.9	13	6.0	14	6.5	85	39.5	93	43.3	-1.23	0.90	Disagree	207
Lack of natural science knowledge	0	0.0	13	6.0	13	6.0	91	41.9	91	41.9	-1.25	0.83	Disagree	208
Failure of previous lessons	0	0.0	5	2.3	17	7.9	95	44.2	86	40.0	-1.29	-1.00	Disagree	203
Lack of student interest	0	0.0	8	3.7	8	3.7	81	37.5	110	50.9	-1.42	0.75	Disagree	207

Table 29 (Continued)

Barrier	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD		Total N
Lack of personal interest	1	0.5	4	1.9	6	2.8	62	28.7	136	63.0	-1.57	0.69	Strongly Disagree	209

Note. S = Strongly agree; A = Agree; N = Neither agree nor disagree; D = Disagree; SD = Strongly disagree

Table 30 displays the break down of group means and standard deviations of perceived barriers by FIT participants in each grade level. The use of real values of group means reports all four grade levels to neither agree nor disagree on statements that lack of school time and lack of available funding were barriers to implementing environmental education into their existing class curriculum.

K-3 teachers were undecided (neither agreed nor disagreed) in regards to lack of administrative support as a barrier, whereas teachers in grade levels 4-6, 7-8, and 9-12 disagreed with the statement. All four grade level groups disagreed on eight of the fourteen barrier statements and strongly disagreed on statements concerning a lack of student interest and a lack of personal interest.

Table 30

FIT Participant Perceptions of Barriers by Grade Level

Barrier	K-3 M	K-3 SD		4-6 M	4-6 SD		7-8 M	7-8 SD		9-12 M	9-12 SD	
Lack of school time in a day has been a barrier to implementing environmental education into existing lessons.	.459	1.22	NE	.296	1.34	NE	.114	1.25	NE	.083	1.18	NE
A lack of available funding is barrier to implementing environmental education into existing lessons.	-.307	1.30	NE	-.339	1.25	NE	-.194	1.33	NE	-.167	1.28	NE
A lack of administrative support has been a barrier to implementing environmental education into existing lessons.	-.387	1.32	NE	-.677	1.28	D	-0.54	1.29	D	-.500	1.16	D
A lack of accessible natural environments in our area is a barrier to integrating environmental education activities.	-.803	1.17	D	-.79	1.38	D	-0.44	1.32	NE	-.95	0.99	D
A lack of community interest is a barrier to implementing environmental education into existing lesson.	-.833	1.14	D	-1.06	0.93	D	-0.89	1.01	D	-.889	.854	D

Table 30 (Continued)

Barrier	K-3			4-6			7-8			9-12		
	M	SD		M	SD		M	SD		M	SD	
A lack of preparation time has been a barrier to implementing environmental education into existing lessons.	.210	1.27	NE	-.360	1.34	NE	0.03	1.21	NE	0.19	1.15	NE
My class size is too large to implement environmental education into existing lessons.	-1.25	0.85	D	-0.92	0.99	D	-0.78	1.11	D	-0.76	1.13	D
A lack of follow-up from FIT coordinators is a barrier to implementing environmental conditions into existing lessons.	-1.19	.70	D	-1.16	.94	D	-.86	1.12	D	-.76	.83	D
My class curriculum has no connection to environmental education.	-1.26	.94	D	-1.11	1.00	D	-.68	1.28	D	-1.06	1.03	D
The environmental education topics are not relevant to what I teach.	-1.35	.93	D	-1.30	.75	D	-1.12	.95	D	-1.2	.87	D

Table 30 (Continued)

Barrier	K-3			4-6			7-8			9-12		
	M	SD		M	SD		M	SD		M	SD	
My own lack of natural science knowledge has been a barrier to implementing environmental education into existing lesson.	-1.20	.81	D	-1.27	.90	D	-1.20	.96	D	-1.27	.69	D
Failure of previous lesson(s) is a barrier to implementing environmental education into existing lessons.	-1.39	.64	D	-1.32	.71	D	-1.47	.51	D	-.86	.93	D
A lack of student interest is a barrier to implementing environmental education into existing lessons.	-1.63	.55	SD	-1.56	.56	SD	-1.24	.93	D	-.94	.92	D
A lack of interest on my part is a barrier to implementing environmental education into existing lessons.	-1.67	.57	SD	-1.60	.77	SD	-1.53	.69	SD	-1.35	.75	D

Note. NE =Neither agree nor disagree; D = Disagree; SD = Strongly disagree

Table 31 compares perceived barriers to integrating environmental education into class curriculum by gender. Means and standard deviations were listed, as well as an interpretation of the data in terms of the real limits. Though no significant differences were found to occur between the two groups, males and females differed slightly on the extent of agreement to the statement "lack of personal interest" as a barrier. Females were in strong disagreement while males were in disagreement.

Table 31

Perception of Barriers to Implementing Environmental Education into Existing Curriculum by Gender

Barrier	Gender	n	M	SD	Interpretation	t
Lack of school time in a day has been a barrier to implementing environmental education into existing lessons.	Male	48	.25	1.34	Neither	.351
	Female	157	.30	1.22	Neither	
A lack of preparation time has been a barrier to implementing environmental education into existing lessons.	Male	48	.17	1.31	Neither	.566
	Female	162	-.03	1.25	Neither	
A lack of available funding is barrier to implementing environmental education into existing lessons.	Male	43	-.28	1.28	Neither	.920
	Female	160	-.27	1.27	Neither	
A lack of administrative support has been a barrier to implementing environmental education into existing lessons.	Male	48	-.48	1.30	Neither	.327
	Female	156	-.53	1.25	Disagree	
A lack of accessible natural environments in our area is a barrier to integrating environmental education activities.	Male	45	-.64	1.33	Disagree	.162
	Female	161	-.80	1.20	Disagree	

Table 31 (Continued)

Barrier	Gender	n	M	SD	Interpretation	t
A lack of community interest is a barrier to implementing environmental education into existing lesson.	Male	46	-.91	.98	Disagree	.288
	Female	162	-.97	.99	Disagree	
My class size is too large to implement environmental education into existing lessons.	Male	46	-.87	1.11	Disagree	.298
	Female	160	-.99	.98	Disagree	
My class curriculum has no connection to. environmental education	Male	48	-1.02	1.04	Disagree	.902
	Female	166	-1.04	1.11	Disagree	
A lack of follow-up from FIT coordinators is a barrier to implementing environmental conditions into existing lessons.	Male	46	-.78	1.11	Disagree	.061
	Female	161	-1.12	.77	Disagree	
My own lack of natural science knowledge has been a barrier to implementing environmental education into existing lesson.	Male	46	-1.22	.92	Disagree	.381
	Female	162	-1.26	.81	Disagree	
The environmental education topics are not relevant to what I teach.	Male	45	-1.29	.84	Disagree	.696
	Female	159	-1.23	.91	Disagree	

Table 31 (Continued)

Barrier	Gender	n	M	SD	Interpretation	t
A lack of student interest is a barrier to implementing environmental education into existing lessons.	Male	45	-1.29	.84	Disagree	.152
	Female	162	-1.45	.71	Disagree	
A lack of interest on my part is a barrier to implementing environmental education into existing lessons.	Male	46	-1.46	.78	Disagree	.120
	Female	163	-1.60	.66	Strongly Disagree	

A comparison of teachers by grade levels taught (independent variable) and their responses to specific perceived barriers (dependent variables) was conducted. Analysis of variance was used and significant differences emerged. Teachers were found to be statistically different when compared by their perception of class curriculum as a barrier to implementing environmental education into their existing classroom curriculum (Table 32). The calculated F value of 3.425 was significant at the $\alpha = .01$ level of significance (F_{cv} (4, 202) = 3.32 < 3.425). A Tukey post hoc comparison found teachers in the K-3 grade level were significantly different from teachers in other grade levels.

Table 32

ANOVA of Class Curriculum as a Barrier by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	22.488	4	5.622	3.293*	a>
Within Groups	341.415	200			
Total	363.902	204			

Note. *p. >0.01 a = K-3; b = 4-6

Teachers in grades 9-12 were found to be significantly different than the other three grade level groups when an ANOVA comparison was made based on extent of agreement to lack of student interest as a barrier to implementation (Table 33). The calculated F value of 6.487 was significant at the $\alpha = .001$ level of significance (F_{cv} (4, 196) = 4.62 < 6.487).

Table 33

ANOVA of a Lack of Student Interest as a Barrier by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	13.159	4	3.290	6.487*	c > a,b,
Within Groups	99.389	196	.507		
Total	112.547				

Note. *p. >0.001 a = K-3; b = 4-6; c = 9-12

A comparison of teachers' perception of the barrier of a failure of a previous lesson was conducted among teachers of the four grade levels (Table 34). The calculated F value of 4.304 was significant at the $\alpha = .01$ level of significance (F_{cv} (4, 199) = 3.32 < 4.304). Post hoc comparison found that teachers in grades 9-12 were significantly different than teacher in grades K-3, 4-6, and 7-8.

Table 34

ANOVA of Failure of Previous Lesson as a Barrier by Grade Level

Source	SS	df	MS	F	Tukey HSD
Between Groups	8.565	4	2.141	4.304*	d > a,b,c
Within Groups	95.517	192	0.497		
Total	104.081	196			

Note. *p. >0.01 a = K-3; b=4-6; c =7-8; d =9-12

Improving FIT Programs

The fourth objective addressed FIT program improvement. Respondents indicated levels of agreement along a six-point "Likert-type" scale for four statements. In regards to "should workshops be conducted during other times of the year besides summer months" (M = .03, SD = 1.02), 70 of 209 teachers (33.5%) were in agreement, and 61 (29.2%) disagreed with the statement. Seventy-eight teachers (37.3%) neither agreed nor disagreed with the idea.

When asked of conducting FIT workshops in more centralized locations of the state (M = -.19, SD = 1.12), 65 of 210 teachers (31.0%) favored the idea, 85 (40.5.%) disagreed, and 60 (28.6%) expressed neither agreement nor disagreement with the statement..

The majority of the teachers (136 of 210 or 64.8%) favored traveling to a resident camp (M = -.82 , SD =1.02) over the idea of commuting to workshop from home. Twenty-three teachers (10.9%) agreed with the idea of commuting to the workshop.

Teacher interest in an advanced FIT or second year workshop was very high (M = 1.23 , SD =1.02) with 167 of 201 (83.1%) responding favorably, and 15 teachers (7.5%) disagreed with attending another workshop. Teachers showing no preference (neither agree nor disagree) accounted for 9.5 percent (19 of 201). Table 35 summarizes the findings.

Table 35

Respondents' Extent of Agreement with Improving FIT Workshops

Improvement	SA n	%	A n	%	N n	%	D n	%	SD n	%	M	SD	Interpretation	Total
Apply to attend advanced FIT if conducted	99	49.3	68	33.8	19	9.5	11	5.5	4	2.0	1.23	.97	Agree	201
Workshops held different times of the year	14	6.7	56	26.8	78	37.3	46	22.0	15	7.2	.03	1.02	Neither A/D	209
Workshops offered in centralized locations	10	4.8	55	26.2	60	28.6	55	26.2	30	14.3	-.19	1.12	Neither A/D	210
Commuting over a resident camp	4	1.9	19	9.0	51	24.3	73	34.8	63	30.0	-.82	1.02	Disagree	210

Table 36

Perceptions of FIT Participants on Improving FIT Workshops

Workshop Activity	Extend/ increase		Decrease/ reduced		Left as is		Total	
	n	%	n	%	n	%	N	%
Length of workshop	17	7.9	6	2.8	192	89.3	215	100
Number of guest speakers	16	7.4	10	4.7	189	87.9	215	100
Time to work on curriculum projects	64	30.2	10	4.7	138	65.1	212	100
Time dedicated to field trips	53	24.5	4	1.9	159	73.6	216	100

Four questions dealt with the schedule of the program of the workshop (Table 36). These were forced-response types of questions asking respondents if activities should be extended/increased, shortened/reduced, or left as it is.

When asked if the length of the workshop should be adjusted, 89.3 percent (192 of 215) indicated leaving as it is. Seventeen teachers (7.9%) favored lengthening, and 6 (2.8%) preferred shortening the weeklong workshop.

Of the number of guest speakers taking part in FIT workshops, 189 (87.9%) preferred to leave the number as it is. Sixteen teachers (7.4%) preferred increasing the number and 10 (4.7%) were in favor of reducing the number.

When asked of the time dedicated to working on teacher's curriculum projects during the workshop, 138 (66.1%) felt the amount of time dedicated was acceptable, while 64 (30.2%) desired more time, and 10 (4.7%) preferred decreasing the time allotted for this activity.

The amount of time dedicated for field trips was acceptable to 159 (73.6%) of the respondents, while 53 (24.5%) preferred more time, and 3 (1.9%) indicated less time was needed.

Two open-ended questions provided respondents with an opportunity to suggest changes in content in existing workshops and topics for consideration for an advanced or second year FIT workshop. The first question specifically asked teachers for suggestions to improve upon the existing workshop format. The 141 responses were analyzed and categorized into thematic areas in regards to ways of improving the content of FIT workshops. These themes were: 1) satisfied with present workshop content; 2) curriculum development needs; 3) specific grade level needs; 4) issues related to geographical regions of the State; 5) balance of contrasting view points about forestry practices and the environment; 6) a lack of time; and 7) need for follow-up contact.

Satisfied with present workshop content (n = 61)

Many respondents were satisfied with the content of the workshops they attended and provided no suggestions or recommendations for improving upon what is presented.

Quote 1: I can't think of any way to improve it. I though it was great!

Quote 2: I thought it was excellent. No improvement necessary.

Quote 3: I have been to about 20 summer workshops and this one (FIT) by far has been the best in regards to materials/books, help, fieldtrips, samples and fun given. Not to mention good food!

These data confirms data reported in Table 32, which indicates that teachers are satisfied with the format of the FIT workshop experience.

Curriculum development needs (n = 29).

An analysis of the data revealed theme was divided into three areas dealing with curriculum needs. First, individuals have a desire for learning about more diverse ecology topics such as animal and plant relationships, tree and plant identification, water, and eco-literacy.

> Quote 1: Increase training skills such as plant ID, aquatic analysis, soil classification.
>
> Quote 2: I thought it was great! May be more rotation through animal, plant, water and bird biology labs with curriculum and lab activities.
>
> Quote 3: I thought it was good, though more emphasis could be placed on Deep Ecology, EcoLiteracy and Bio-regionalism for my tastes.

Second, there existed a need to address meeting California State Standards in all curriculum areas.

> Quote 1: Align content to new science standards, math standards, LA standards, social studies standards.
>
> Quote 2: Tie in the State Science Standards- this will not be easy for the 6^{th} grade and very difficult for 7^{th} and 8^{th}.
>
> Quote 3: You do not address the present realities of standardized testing and/or recent CA State standards in your survey.

Third, respondents expressed a need to focus more on development of their self-developed curriculum units.

> Quote 1: I think we should walk away with a unit and some prepared lessons written.
>
> Quote 2: More teacher units and projects that we can actually see.

> Quote 3: I don't think it needs to be improved other
> than more time in the evenings to prepare curriculum.
> Once school starts I have very little time.

This supports the findings reported in Table 24, where 37.7 percent of respondents indicated they did not return their curriculum unit to FIT, and of Table 32 where 30.2 percent of respondents wanted more time at workshops for developing their curriculum units.

Issue related to geographical regions of the State (n = 24).

Two categories emerged from the responses related to the needs of teachers in this area; making the connection to the urban settings and a focus on ecosystems of different geographical regions of the State. Teachers not residing in the redwood or pine forested regions of the state indicated a need for learning about the specific ecosystems of their geographic locations and making the connection to their class curriculum.

> Quote 1: I would like to learn more about using my local
> environment in teaching – chaparral & oak woodlands.

> Quote 2: Would like to see more application to chaparral,
> even desert habitats. I really enjoyed my FIT class.

> Quote 3: I teach in urban chaparral (not heavily forested area)
> and would have liked more resources tailored to my schools'
> local environment

Specific grade level needs (n = 16).

Although the workshop provided break out session for teachers to work in groups by grade levels, teachers expressed a need for more depth and desired more material to meet specific grade level needs such as secondary education.

> Quote 1: Suggestions about implementing FIT materials
> into already established H.S. curriculum.

Quote 2: Higher level, faster pace, and more advanced tech activities for high school.

Quote 3: More challenging for high schoolers on a college tract

For others, the need for making a connection to urban forestry practices and the city environment was an expressed need.

Quote 1: For me- I thought I would like a little more concrete tie-in to our area – suburbs have a different reality.

Quote 2: Outreach to metro/urban schools means focus on there nearby native ecosystems. This could only be practiced if workshops were located in the city.

Quote 3: Perhaps connection to student experiences for students in cites. Also more physical activities (hikes).

Contrasting viewpoints about forestry practices (n = 11).

Comments from respondents indicated a need for delivery of more balanced view points on environmental and forestry practice issues presented at FIT

Quote 1: Too industry dominated. More grassroots environmentalism included.

Quote 2: More contrasting viewpoints about forestry practices. Less lumber co. influence.

Quote 3: I personally feel that the conservation and preservation issues were underplayed but that is understandable since the timber lobby is financing. One of the lumber companies hosted delicious going away picnic buffet and barbecue the last day. Hidden behind the bushes around the property wad the ghostly remains of the giant redwoods – rotting stumps (perhaps they don't' rot?) 12 to 15 feet in diameter. I will never forget this haunting reminder.

The second open-ended question asked for input on what participants believed should be the focus of an advanced or level II FIT workshop. Responses were categorized into themes. The number of responses was noted for each area.

Specific forestry-related curriculum topics (n=39).

Of the 132 respondents who provided a response to the question, 29.5 percent desired topics that dealt with specific curriculum subjects and activities dealing with fish & wildlife, plants & trees, fire, geology, careers, and recycling.

Curriculum Development/Sharing of Teaching Resources (n=19).

Fourteen percent of the respondents requested time dedicated to more in depth curriculum development, working with curriculum units, and interaction with other teachers to engage in dialogue about the successes of specific teacher resources and curriculum unit ideas.

State Standards (n=16).

Respondents (12%) indicated a need to have a second year FIT workshop focus on meeting current California State Curriculum Standards using FIT materials and activities all curriculum areas.

Forestry Issues/Politics/Economics/Management (n=15).

Eleven percent of the respondents were interested in hearing more about both sides of current forestry issues and topics related to forest management, policy and economic matters.

Address Specific Grade Levels (n=9).

Workshop participants (6.8%) expressed a need for receiving more material for specific grade levels from Kindergarten to the high school grade levels. Suggestions included scheduling more time for breakout sessions as well as separate workshops by grade levels.

Watershed, water quality, stream study (n=8).

Six percent of the workshop respondents indicated an interest in learning about topics dealing with streams, stream rehabilitation, water quality issues, and watershed management.

Ecosystems (n=7).

A presentation and discussion of other California ecosystems such as chaparral, desert, oak woodlands, coastal, or topics covering other non-conifer forest areas of the state were suggested by 5.3 percent of the respondents.

Student Activities (n=7)

Five percent of the respondents expressed an interest in obtaining more material for conducting student activities.

Technology (n=6)

Current technologies utilized in forest management including GIS, and GPS mapping were topics mentioned by 4.5 percent of the respondents as a topic of second year workshops.

Fundraising/Grantwriting (n=3)

A small percentage (2.2%) of the respondents were interested in a second year workshop that included details on writing grants and obtaining funds to conduct activities such as field trips.

Table 37 summarizes the findings of the responses for recommendations of topics for a second year FIT workshop.

Table 37

Summary of Recommendations of Topics for Advanced FIT Workshops (n=132)

Theme	Frequency	Percent
Animals/ Fisheries /Wildlife/ Plants/ Fire/ Geology/ Recycling/	34	25.7
Curriculum Development/Curriculum Units/ Sharing of Teaching Resources	19	14.3
State Standards	16	12.1
Forestry Issues/Politics/Economics/Management	15	11.3
Address Specific Grade Levels	9	6.8
Watershed / water quality / stream study	8	6.0
Ecosystems	7	5.3
Student Activities	7	5.3
Technology	6	4.5
Fundraising/Grantwriting	3	2.2

Tables in the appendices (Appendix E) provide a detailed listing of all comments categorized by thematic areas.

Agriculture Student Questionnaire

Table 38 presents the demographic information about the students completing the questionnaire for this study. FIT-trained students made up 37.3 percent (72) of the student sample while 121 (62.7%) were instructed by non-FIT teachers. Overall, there were 122 (63.2%) male students and 70 (36.3%) female students in the population sample.

Table 38

Selected Demographic Characteristics of Agricultural Education Students of FIT Trained and Non FIT-Trained Agriculture Instructors

Characteristics		FIT-Trained		Non-FIT		Totals	
		n	%	n	%	N	%
Gender	Male	39	32	83	68	122	64%
	Female	33	47	37	53	70	36%
Grade	8th	7		0		7	4%
	9th	26		2		28	15%
	10th	20		35		55	29%
	11th	13		39		52	27%
	12th	6		44		50	26%
Community	Urban	0		17		17	9%
	Suburban	14		34		48	25%
	Town	16		34		50	26%
	Rural	41		34		75	39%

By grade level, the student population was nearly evenly split among tenth, eleventh and twelve grade students, combining to comprise 81.7 percent of the sample.

Eighth and ninth grade students made up 18.2% of the returns. Seven eighth graders participated as well as 28 ninth grade students.

An examination of where students live found seventeen students (9% of the respondents) reported living in an urban community (population of 50, 000 or greater) and 48 (25% of the respondents) live in a suburban community (population of 15,000 – 49,999). Fifty students (26% of the respondents) cite residing in small towns with a population of less than 14,999, and 75 students (39% of the respondents) live in rural areas either on farms or ranches or in the country.

Impact of FIT on Knowledge and Attitude

The fifth objective sought to determine what impact the FIT workshop had on the environmental knowledge and attitudes of students of specific program graduates. All students were asked to read and correctly identify the answer to fifteen multiple response questions in the environmental and forestry knowledge section.

Secondly, students were asked to read and indicate their level of agreement on 27 environmental attitude statements. Total scores were computed for each group. The knowledge and attitude mean scores of students of FIT-trained agriculture instructors were compared with students of non-FIT trained agriculture instructors using a t-test to compare group means.

Significant differences were found to exist between the two groups on eight of the fifteen multiple-choice questions of the environmental knowledge assessment. Students of FIT-trained agriculture instructors report a significantly higher mean score on seven of the eight questions. Students of the non-FIT trained instructors scored significantly higher on one question dealing with "biggest causes of wildfires in the country" ($t = -1.200$, $p < 0.05$). The mean group total score of students of FIT-trained teachers was higher (M = 7.46, SD = 2.95) than the group mean score of students of non-FIT trained agriculture instructors (M = 6.12, SD = 2.44). These were statistically significant ($t = 3.148$, $p < 0.05$). Table 39 illustrates the means and standard deviations of both groups on each individual question as well as a total mean score.

Table 39

Environmental Knowledge of Agriculture Students of FIT Trained and Non FIT-Trained Agriculture Instructors

Knowledge questions	FIT-Trained		Non-FIT		
	M	SD	M	SD	t
There are many different kinds of animals and plants, and they live in many different types of environments. What word is used to describe this idea?	.72	.45	.62	.49	1.479*
Which of the following is a renewable resource?	.75	.44	.71	.46	.595
Which of the following household materials is considered hazardous waste?	.74	.44	.76	.43	-.371
What are range plants that thrive under heavy grazing called?	.24	.43	.14	.35	1.606*
What are animals and people that feed on plants and other animals called?	.86	.35	.66	.48	3.355*
From what source of power does most of the electricity in the U.S. come from?	.54	.50	.28	.45	3.622*
What is an organism that feed on both plant and animal called?	.82	.39	.68	.47	2.179*
What is the upper limit of the population of a given species in an ecosystem called?	.28	.45	.24	.43	.644
What major factor is responsible for biomes (besides precipitation)?	.47	.50	.34	.48	1.777*
Forestland in California makes up approximately how much of the total land area of the state?	.35	.48	.24	.43	1.534*

Table 39 (Continued)

Knowledge questions	FIT-Trained		Non-FIT		t
	M	SD	M	SD	
What element makes up almost 80% of the earth's atmosphere in a state?	.40	.49	.13	.34	4.081*
What is one of the biggest causes of wildfire in this country?	.22	.42	.30	.46	-1.200*
All living things are made up of about how much water?	.29	.46	.26	.44	.496
What part of the soil acts as a sponge to hold water in place?	.46	.50	.39	.49	.899
What type of rock forms when magma cools and hardens?	.32	.47	.38	.49	-.899
Total knowledge score	7.46	2.95	6.12	2.44	3.257*

Note. * $p<0.05$

A t-test was used to compare the mean group scores of the student groups on the environmental attitude assessment (Table 40). Significant differences were reported between the two student groups on 3 of the 27 attitude statements. FIT-trained students report a significantly higher environmentally conscious attitude on the statement "The balance of nature is very delicate and easily upset." ($t = 2.261$, $p. > 0.05$), and on the statement "More forestland should be set aside for wilderness preserves" ($t = 2.041$, $p.> 0.05$). However, the non-FIT trained students demonstrated a significantly environmentally conscious attitude on the statement "Industries should be held financially responsible for any pollution that they cause" ($t = -2.128$, $p. > .05$). Table 40 depicts the results of this comparison.

Table 40

Environmental Attitude Scores of Agriculture Students of FIT-Trained and Non FIT-Trained Agriculture Instructors

Attitude Statements	FIT-Trained M	FIT-Trained SD	Non-FIT M	Non-FIT SD	t
The balance of nature is very delicate and easily upset.	-.583	.989	-.909	.931	2.261*
Humans have the right to modify the natural environment to suit their needs.	.236	1.13	.212	1.18	.141
Farms should be held responsible for any damages to the environment.	-.535	1.34	-.587	1.15	.271
Fires in the forest are destructive and should be prevent at all cost.	-.234	1.22	-.492	1.33	1.329
A forest that is managed for timber production has little value for other purposes such as recreation, wildlife, and pure water	.236	1.16	.355	1.20	-.684
Some wilderness areas should be preserved from development no matter how much money it costs.	.722	1.28	.884	1.05	-.908
The most important use of California's forestland is to produce game and fish for sportsmen.	.389	1.15	.240	1.19	.863
The future of California's forestland is dependent upon stopping logging.	4.17	1.26	.306	1.10	-1.474
Grazing livestock on forestlands has a negative impact on the environment.	.437	1.11	.367	1.10	.424
I would have a problem drinking recycled water.	-8.45	1.28	-.202	1.27	.610

Table 40 (Continued)

Attitude Statements	FIT-Trained		Non- FIT		
	M	SD	M	SD	t
There is little difference in how forested lands are managed by the National Park Service and the United States Forest Service.	-2.78	.978	-5.83	.770	.226
I would allow logging on my property to make money.	-5.56	1.31	7.50	1.65	-.605
Animals that provide meat for people are the most important to protect.	-.167	1.09	7.44	1.17	-1.447
Forests are for people and should be managed to provide all goods and services, timber, water, recreation, etc.	.236	1.33	.322	1.21	-.451
I feel hunting and fishing benefit the balance of nature.	.458	1.05	.719	1.04	-1.68
Rivers should not be dammed to construct reservoirs or lakes.	.250	1.07	-1.65	1.09	1.662
Private land owners have more freedom to remove timber from their property than do publicly managed lands	-.361	1.07	-.471	1.07	.693
I feel logging practices are beneficial to the forest ecosystem.	2.77	1.15	.149	1.01	-.740
I feel individuals should be allowed to use private land for any purpose.	1.41	1.15	-.667	1.15	.427
All plant and animals play an important role in the environment.	1.27	1.09	1.52	.837	-1.622

Table 40 (Continued)

Attitude Statements	FIT-Trained M	FIT-Trained SD	Non- FIT M	Non- FIT SD	t
Landowners should be allowed to drain wetlands/swamps for agricultural or industrial uses.	1.39	1.24	4.17	1.25	-.150
I feel people's jobs are more important than protecting the home of endangered plants or animals.	.569	1.16	.575	1.18	-.032
Industries should be held financially responsible for any pollution that they cause.	.722	1.17	1.08	1.02	2.128*
Wild animals that are dangerous to humans should be destroyed.	.847	1.26	.924	1.18	-.415
Horseback riding causes damage to hiking trails and should be prohibited.	.971	1.08	.917	.975	.353
More forestland should be set aside for wilderness preserves.	-.292	1.29	-.658	1.04	2.041*
Off-road vehicles are not damaging to the environment	-.111	1.35	.142	1.37	-1.251
Total Environmental Attitude Assessment Score	4.96	7.48	5.34	7.39	-.344

Note. *p. < 0.05

A comparison of the mean environment knowledge assessment between FIT and Non-FIT trained students found that significant differences to exist between both groups (t =3.148, p. > 0.05). The results are presented in Table 41.

Table 41

T-Test Comparison of Environmental Knowledge Assessment

Variable: Knowledge	N	M	SD	df	t	Sig
FIT students	72	7.46	2.95	191	3.148	.001*
Non-FIT students	121	6.12	2.44			

*p >0.05

Further, a t-test comparison of the group mean scores on the environmental attitude assessment reveals no significant differences exist between the groups of students (Table 42).

Table 42

T-Test Comparison of Environmental Attitude Assessment

Variable: Attitude	N	M	SD	df	t	Sig
FIT students	72	4.96	7.48	191	-.343	.732
Non-FIT students	121	5.34	7.39			

A comparison of total environmental knowledge scores was conducted between male and female students. Even though the group score for male students (M = 6.76, SD = 2.64) was higher than the group score for females (M = 6.41, SD = 2.83), there was no significant differences between the groups (Table 43).

Table 43

T-Test of Comparisons of Mean Environmental Knowledge Assessment by Gender

Variable: Knowledge	N	M	SD	df	t	Sig
Male students	122	6.76	2.64	190	.857	.392
Female students	70	6.41	2.83			

When Environmental attitude of male students was compared to female students, females scored (M = 6.63, SD = 6.98) significantly higher than males (M = 4.45, SD = 7.54) ($t = -1.78$, $p. > 0.05$) this information is presented in Table 44. This suggests that females possessed an environmentally conscious attitude of stewardship than their male peers.

Table 44

T-Test Comparisons of Mean Environmental Attitude Assessment By Gender

Variable: Attitude	N	M	SD	df	t	Sig.
Male students	122	4.45	7.54	190	-1.78	.049*
Female students	70	6.63	6.98			

*p < 0.05

An analysis of variance was conducted to determine differences existing between environmental knowledge of students and sizes of community where students reside. Table 45 illustrates that significant differences existed F_{cal} (3,189) $F_{cv} = 2.60 < 5.704$, $p. > 0.05$. A Tukey honestly significant differences comparison found that students living in metropolitan areas are significantly different from students living in the suburban areas and those reportedly living in towns. Findings suggest that students residing in areas with greater open spaces (natural environments) are more knowledgeable about their natural surroundings perhaps due to instruction than students coming from metropolitan areas.

Table 45

ANOVA of Environmental Knowledge Scores of Students By Community Size

Source	SS	df	MS	F	Sig.	Tukey HSD
Between Groups	118.309	3	39.436	5.704	.001*	m > s, t
Within Groups	1285.901	186	6.913			
Total	1404.211	189				

Note. *p < 0.05 m = Metro; s = Suburb; t = Town

The use of ANOVA to compare students' scores on the environmental attitude assessment by community size found no significant differences between groups (Table 46).

Table 46

ANOVA of Environmental Attitude Score of Students By Community Size

Source	SS	df	MS	F	Sig
Between Groups	90.858	3	30.286	.539	.656
Within Groups	10,450.936	186	56.188		
Total	10,541.795	189			

Relationships Between and Among Characteristics

The purpose of this objective was to determine if a correlation exists between personal characteristics (gender, grade level, and community size background) and environmental literacy. A Pearson product moment correlation was utilized to determine if a relationship existed between gender, grade level, and community size of students of FIT-trained teachers and total environmental knowledge scores.

Table 47

Correlation Between Gender, Grade Level, Community Size, and Performance on Environmental Knowledge Assessment of Students of FIT-Trained Teachers

Variables	Correlation
Gender / Total Knowledge Score	-.058
Grade Level / Total Knowledge Score	.47 *
Community Size / Total Knowledge Score	.37*

Note. *Significant *r* at p. > 0.01

Table 47 shows a statistically significant and moderate correlation found between the two variables, grade level and total environmental knowledge ($r = .47$). This suggests that as the grade level of students' increase, so did their number of correct responses.

Additionally, a positive moderate relationship exists between where students live and their total environmental knowledge score ($r = .37$), suggesting that students living in less densely populated areas are more knowledgeable about their environment than students living in largely populated communities.

Table 48

Correlation Between Gender, Grade Level, Community Size, and Performance on Environmental Attitude Assessment of Students of FIT-Trained Teachers

Variables	Correlation
Gender / Total Attitude Score	.294*
Grade Level / Total Attitude Score	-.153
Community Size / Total Attitude Score	.035

Note. *Significant *r* at p. > 0.05

Table 48 illustrates a statistically significant low to moderately positive relationship (*r* =. 294) was found to exist between gender of FIT-trained students and their total score on the environmental attitude assessment.

Table 49

Correlation Between Gender, Grade Level, Community Size, and Performance on Environmental Knowledge of Students of Non-FIT Trained Teachers

Variables	Correlation
Gender / Total Knowledge Score	-.136
Grade Level / Total Knowledge Score	.167
Community Size / Total Knowledge Score	.066

In Table 49, Non-FIT trained students showed a non-significant low negative relationship between gender and total knowledge score (*r* =-.136) as well as a low positive correlation between grade level and total knowledge score (*r* =.167) while the relationship between community size and total knowledge score was negligible (*r* =.066).

Table 50

Correlation Between Gender, Grade Level, Community Size, and Performance on Environmental Knowledge Assessment of Students of Non FIT-Trained Teachers

Variables	Correlation
Gender / Total Attitude Score	.053
Grade Level / Total Attitude Score	-.056
Community Size / Total Attitude Score	.060

Likewise, when correlation between non-FIT trained students characteristics (gender, grade level, and community size) and total environmental attitude assessment scores were analyzed, negligible relationships ranging from (r = .053) to (r = .060) were found (Table 50).

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The purpose of this chapter is to present a summary of the study problem, purpose, objectives, methodology, and major findings of the study. Conclusions and recommendations or implications were also included based on the analysis and summarization of data collected from the surveys.

Summary

Statement of the Problem

To aid teachers in the integration of environmental education and natural resource management curriculum into their existing classrooms, the University of California Cooperative Extension, Shasta County Department of Education, the Northern California Chapter of Society of American Foresters and private timber industry developed the Forestry Institute for Teachers (FIT). The purpose of the Institute was to help teachers integrate environmental education materials into their existing class curriculum. The problem of this study was to evaluate the impact of the Forestry Institute for Teachers workshop on the integration of environmental education materials into participants' classrooms.

Purpose of the Study

The purpose of this study was to evaluate the impact of a weeklong resident summer workshop on the integration of environmental education materials in K-12 teacher classrooms and on the environmental knowledge and attitudes of select teachers and their students.

Objectives of the Study

The objectives of this study were:

1. To develop a profile of Forestry Institute for Teachers (FIT) participants.
2. To determine frequency of and method of use of environmental education materials provided to teachers by FIT.
3. To identify if perceived barriers exist that prevent teachers from integrating environmental education topics into the curriculum.
4. To identify areas for improving the FIT program.
5. To determine what impact FIT had on the environmental knowledge and attitudes of agricultural education teachers who completed FIT and their students when compared to a similar group with no FIT experience.
6. To determine of relationships exist between and among personal of teachers and students and environmental literacy.

Major Findings of the Study

Profile of FIT Participants

Objective one was to develop a profile of K-12 teachers who attend a FIT workshop. The selected variables used in this study included: gender, age, years teaching, educational level, grade level taught, subject matter taught (agriculture or not) community size where teaching occurs, and membership in conservation-type organizations. Profiles of FIT participants were summarized in Table 51.

Table 51

Profile of FIT Participants

Characteristic	Result
Gender	Female
Age	46 years
Number of years teaching	16 years
Educational Level	Bachelors Degree
Grade Level Taught	4-6 grades
Subject Matter Taught	Non-Agriculture
Residence	Metropolitan Area
Membership in Conservation-type Organization	No

Frequency and Method of Use of FIT Materials

Objective two was to describe the frequency and method of use of FIT materials in the classroom by workshop participants. Findings of frequency of use are summarized in Table 52.

Table 52

Frequency of Use of FIT Materials by FIT Workshop Participants

Nature of Use	Result
Number of times used FIT in classroom teaching	6
Number of different FIT activities used in classroom teaching	9
Number classes taught using FIT materials	4
Frequency of outdoor activities since attending FIT	Increased
Frequency of environmentally related field trips	Increased
Number of students taught in a year using FIT materials	78
Amount of instructional time spent on FIT activities with students	28 minutes
Number of times curriculum unit was used in classroom	3
Number of daily lessons using FIT materials	13
Number of lessons taught integrating environmental education	Increased

Table 53

Respondents' Description of Method of Use of FIT Activities in the Classroom

Nature of Use	Response
Able to include concepts about forest ecology and EE into curriculum	Agree
Opportunities for learning that is interesting, useful and sound	Agree
Meet science requirements	Agree
Meet social studies requirements	Neither agree nor disagree
As a recreational activity	Neither agree nor disagree
Requirements of course of study	Neither agree nor disagree
Do not care for materials	Strongly Disagree
No plans to use it	Strongly Disagree

FIT participants are more likely to select FIT where appropriate and use them as part of their teaching than to develop a course of study around the FIT materials.

Table 54

Perceptions of Integration of Environmental Education into Classroom Curriculum

Statement	Agree/Disagree
Feel prepared to integrate EE into my lessons	Agree
Curriculum unit was useful for integrating EE into lessons	Agree
Material received from FIT was useful in integrating EE into lessons	Agree
Materials presented was useful for implementing EE into lessons	Agree
Material presented at FIT was at the appropriate level for my understanding	Agree
Other teachers have integrated EE into their lessons since I attended FIT	Neither agree nor disagree
Material was not what I was looking for in EE materials	Disagree
Material presented at FIT was not appropriate for my grade level and subject area	Disagree
I did not have enough of a background in EE to understand the concepts being presented	Strongly Disagree

Note. EE = Environmental Education

The majority of FIT participants completed and returned their curriculum units to FIT. Those that did not indicated that a lack of time was the obstacle.

Perceived Barriers to Integrating Environmental Education

The purpose of the third objective was to identify perceived barriers that would prevent FIT participants from integrating environmental education into their classroom curriculum. A summary of findings is found in Table 55.

Table 55

Perceived Barriers to Integrating Environmental Education into Classroom Curriculum

Barrier	Agree/Disagree
Lack of preparation time	Agree
Lack of school time	Neither agree nor disagree
Lack of funding	Neither agree nor disagree
Lack of administrative support	Disagree
Lack of accessible natural environments	Disagree
Lack of community support	Disagree
Class size too large	Disagree
Lack of student interest	Disagree
Lack of follow-up by FIT coordinators	Disagree
Class curriculum has not connection to EE	Disagree
Environmental education topics are not relevant to what I teach	Disagree
Lack of natural science knowledge	Disagree
Failure of previous lesson	Disagree
Lack of personal interest	Strongly disagree

Areas for Improving the FIT Program

Objective four sought to identify methods for improving FIT workshops. Table 56 presents findings of participant responses.

Table 56

FIT Participants Perceptions of Improving Exiting Workshops

Statement	Finding
Would apply to advanced or second year FIT workshop if offered	Agree
Length of FIT workshops	Left as is
Number of guest speaker	Left as is
Amount of time to work on curriculum units	Left as is
Amount of time dedicated to field trips	Left as is
Workshops should be held at other times of the year	Neither agree nor disagree
Workshops should be conducted in more centralized locations of the state	Neither agree nor disagree
Commuting to workshop rather than travel to resident camp	Disagree

To the first of two open-end response questions regarding workshop improvement over half of the respondents provided suggestions for specific content focus (Table 57) while 43.2 percent were satisfied with the present format. Teachers want more information dealing with curriculum development, issues relating to other geographical locations of the state, material relating more to their specific grade level, and desire to hear a balanced view of controversial issues dealing with the forest and the environment.

A complete listing of responses to the question of "How can the content of the FIT Workshop be improved?" is found in the appendices (Appendix E, F).

Table 57

Summary of Recommendations for Improving Content of Existing FIT Workshops (n=141)

Theme	Frequency	Percent
Satisfied with present workshop content	61	43.2
Curriculum development needs	29	20.5
Issue related to geographical regions of the State	24	17.2
Specific grade level needs	16	11.3
Contrasting viewpoints about forestry practices	11	7.8

The second open-ended question asked respondents to indicate what topics should be covered in a second year or level II FIT workshop if it were offered. The 132 responses to the question were categorized into seven major themes. Table 58 displays the major themes and the frequency & percentage of respondents suggesting the topics.

One quarter of the respondents expressed interest in specific subject matter topics pertaining to the forest or environment.

Table 58

Summary of Recommendations of Topics for Advanced FIT Workshops (n=132)

Theme	Frequency	Percent
Animals/ Fisheries /Wildlife/ Plants/ Fire/ Recycling	34	25.7
Curriculum Development/Curriculum Units/ Sharing of Teaching Resources	19	14.3
State Standards	16	12.1
Forestry Issues/Politics/Economics/Management	15	11.3
Address Specific Grade Levels	9	6.8
Watershed / water quality / stream study	8	6.0
Ecosystems	7	5.3
Student Activities	7	5.3
Technology	6	4.5
Not Specific	5	3.8
Fundraising/Grantwriting	3	2.2
Geology	3	2.2
Careers	2	1.5

Impact of FIT on Environmental Knowledge and Attitude of Agricultural Education Students

Objective five was to determine what impact FIT had on the environmental knowledge and attitudes of agricultural education teachers who completed FIT and their students when compared to a similar group with no FIT experience. Comparisons were made based on performance on environmental knowledge and attitude assessments.

Students of agricultural education instructors who completed a FIT workshop scored significantly higher on an environmental knowledge assessment than students of agricultural education instructors with no FIT workshop training. On the environmental attitude assessment, no significant difference between the two groups of agriculture students exists.

Relationships Between and Among Personal Characteristics

Objective six sought to determine if relationships exist between and among personal characteristics (gender, grade level, and community size background) of teachers and students and environmental literacy.

1. Though the group means knowledge score for males was slightly higher than females, no significant differences existed.
2. Though the group means attitude score for females was slightly higher than males, no significant difference existed.
3. Students living in different size communities are significantly different from each other based on environmental knowledge.
4. A significantly moderate relationship exists between where FIT-trained students reside and their environmental knowledge where as no significant relationship exists for non-FIT trained students.
5. A significantly moderate relationship exists between grade level of FIT-trained students and their environmental knowledge score however, no significant relationship exists for non-FIT trained students.
6. In regards to environmental knowledge, non-FIT students residing in metropolitan areas were significantly different from urban and suburban non-FIT students.

7. In regards to environmental knowledge, urban FIT-trained students were significantly different from suburban FIT students and FIT students residing in towns.

Conclusions

Based on the findings of this study the following conclusions were made:

1. The typical FIT participant is a female elementary teacher with 16 years of teaching experience, holds a BS degree, and teaches in a metropolitan area.
2. FIT participants are using the environmental education materials provided by FIT (Project Learning Tree, Project WILD, Tree Cookies, etc.) in their classroom teaching as well as their curriculum units to teach concepts about forest ecology, to meet science requirements or other requirements for their course of study.
3. Teachers select FIT activities where appropriate and use them as part of their teaching.
4. FIT participants perceive time as a barrier to preventing teachers from successfully integrating environmental education topics into their classroom curriculum.
5. FIT participants are satisfied with the workshop format.
6. FIT participants are in favor of and are willing to participate in a second year FIT workshop if it was made available.
7. FIT participants suggest that the content of existing workshops focus on providing a curriculum that meets California State Standards in all grade level areas.
8. Topics of a second year workshop should include: specific curriculum topics & activities related to fish & wildlife, plants & trees, fire, and recycling: instruction on curriculum development; sharing of teacher resources (curriculum units); diverse ecosystems (other than conifer forests); forestry issues; state curriculum standards; and forest technology.

9. Students of agricultural education teachers that attended a FIT workshop scored significantly higher on environmental knowledge assessment than students of agricultural education teachers with no FIT experience.

10. Grade level and community location of FIT participants is significant to how FIT participants use FIT materials.

11. Grade level and community location of agriculture students of FIT participants is of significance in regards to environmental knowledge.

12. The Forestry Institute for Teachers (FIT) has had a favorable impact on teaching Environmental Education (EE) in schools taught by participants.

13. FIT has had a greater impact upon teachers of younger students.

14. FIT has more potential for Agricultural Education and other secondary applications than is being utilized.

Recommendations

Based upon the conclusions and major findings of the research, the following recommendations were made:

1. A recommendation to the planners and coordinators of FIT workshops is to develop strategies for attracting a stronger attendance of male teachers as well as less experienced teachers. Encourage the attendance of secondary school instructors of all instructional areas.
2. Provide opportunities for former FIT attendees to return and share their classroom experiences and curriculum unit materials with present workshop participants.
3. Prepare copies of returned curriculum units on a format such as a CD that can be produced and distributed to all FIT participants.
4. Although teachers were satisfied with the format of the workshops, particular areas that respondents indicated need to be addressed in more detail included: Curriculum development needs; issue related to different geographical regions of the State where participants reside (Southern California); specific grade level needs; and contrasting viewpoints about forestry practices.
5. There is interest from FIT attendees in participating in a second year FIT workshop. Examine the possibilities of developing a second year or advanced level of FIT.
6. Workshop content for a second year FIT workshop should include: specific curriculum topics and activities that focus on fish & wildlife, plants & trees, fire and recycling; curriculum development; sharing of teaching resources (curriculum units); addressing state curriculum standards; forestry issues; address specific

grade level needs; watershed / water quality / stream study; ecosystems; student activities; and forest technology.

7. Conduct FIT workshops in other geographic areas of the state to focus on regional needs of teachers. Specific topics to include chaparral and oak woodlands, coastal and dessert ecosystems, watersheds, and needs of metropolitan and urban teachers.
8. Provide a balance of viewpoints to the societal issues of forestry management. Include the environmentalist, as well as preservationist and conservationist points of view.
9. Invite university teacher educators to participate in a FIT workshop to provide the opportunity to introduce FIT materials to preservice teachers in professional education preparation programs throughout California.
10. Recommend to the leadership of the California Agriculture Teachers Association (CATA) that based on findings of performance of agriculture students, encourage a higher number of secondary agricultural education teachers to attend a regular FIT summer workshop.
11. Examine the feasibility of conducting a specific FIT workshop session to be developed to focus primarily on the integration of forest ecology and environmental education into the California agricultural education curriculum.
12. Encourage Society of American Forester' chapters in other states to work collaboratively with the Cooperative Extension personnel from the land-grant universities to develop and establish similar workshops utilizing the Forestry Institute for Teachers as a model.

Recommendations for Research

1. An opportunity for further research exists in conducting a qualitative analysis of teachers attending FIT workshops to determine motivation factors for attending and changes in pre and post attitude and knowledge assessment.
2. Additionally a longitudinal study to measure participant environmental attitudes over extended periods and of time of student environmental knowledge and attitudes of all teachers that attend a FIT workshop
3. A similar study may be conducted that focuses on environmental knowledge and attitudes of a larger population of K-12 students. The purpose would be to determine the effects of the FIT workshop on information transfer and possible effects on student attitude and behavior.
4. An assessment of environmental knowledge and attitudes of students attending the same school or school district where various grade level classes led by FIT-trained teachers and non-FIT trained teachers should be conducted. Variability of community size, and environmental conditions can be minimized. A study of this type may be conducted in several geographic locations across the state.

Implications

The conclusions from this study indicated the Forestry Institute for Teachers forest and environmental workshop was effective in providing teachers with knowledge, skills, and materials to satisfactorily integrate environmental education topics into their classroom curriculum. The findings provide a baseline from which future evaluations may be conducted and compared to determine growth and improvement.

Additionally, the experience for secondary agricultural education teachers had an impact on environmental knowledge of their students. The workshop can be an effective tool for increasing environmental knowledge on a larger population of secondary agricultural education students in California.

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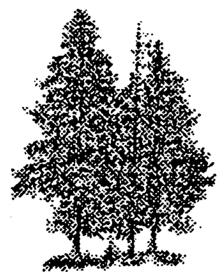
APPENDICES

APPENDIX A

FIT WORKSHOP QUESTIONNAIRE



Forestry Institute for Teachers Questionnaire

Please direct any questions or comments to:

Edward Franklin, Research Associate
Department of Agricultural Education, Communications, and 4-H Youth Development
448 Agricultural Hall
Oklahoma State University
Stillwater, OK 74078-6031
(405) 744-6942 frankea@okstate.edu

The purpose of this survey is to determine the degree to which objectives of the Forestry Institute for Teachers workshop were met. Your participation in this survey is important to evaluate the success of the Institute.

Directions: Read each statement completely. Select the most accurate response to each statement and mark or circle your answer. Forestry Institute for Teachers will be denoted as FIT.

Section I - Frequency of Use of FIT Activities

Please fill in the blank or circle your response.

1. How often do you use FIT activities in your classroom teaching in a year? __________
2. How many different FIT activities do you use in classroom teaching in a year? __________
3. How many classes do you teach using FIT materials? __________
4. Since attending FIT, my use of outdoor activities has:

   a. increased   b. decreased   c. remained the same

5. Since attending FIT, the number of environmentally–related field trips I incorporate into my teaching has:

   a. increased   b. decreased   c. remained the same

6. What is the total number of FIT activities you typically use with students in a year? __________
7. What is the average amount of instructional time you spend with students on any one FIT activity? __________

8. What is the number of students you teach in a year using FIT activities? __________

9. What is the number of times you have used the curriculum unit you developed at FIT? ______

10. As a result of attending FIT, how many daily lessons on the average have you integrated into your curriculum each year?

    ____

11. Since attending FIT, how has the number of lessons you teach that integrate environmental education? (Circle one answer.)

    a. increased   b. decreased   c. remained unchanged

Section II - Use of FIT Materials

Of the reasons listed below please respond to each statement by using the alphabetical scales described below.

SA = Strongly Agree   A = Agree   N = Neither agree or disagree
D = Disagree   SD = Strongly Disagree   N/A = Not Applicable

I use FIT activities in my teaching:

1. To be able to include concepts about forest ecology and the environment into my curriculum.

   SA   A   N   D   SD   NA

2. To provide students with opportunities for learning that is interesting, useful and instructionally sound.

   SA   A   N   D   SD   NA

3. To help meet science requirements.

SA A N D SD NA

4. To meet social studies requirements.

SA A N D SD NA

5. As a recreational activity.

SA A N D SD NA

6. To fulfill one or more requirements of my graded course of study.

SA A N D SD NA

7. I do not care for the materials and do not plan to use them.

SA A N D SD NA

8. I have no plans to use the materials in the future

SA A N D SD NA

9. Which of the following statements best describes your approach to using FIT activities **(check one)**?

O I use FIT activities as the basis for a course of study or as a basis for one or more instructional units I teach.

O I select FIT activities where appropriate and use them as part of my teaching.

O I do not use the FIT activities in my teaching.

10. What activities do you use most often with your students?

____

____

Section III – Integrating Environmental Education Into Your Curriculum.

Using the alphabetical scales, please respond to each statement by circling the appropriate letter(s) following each statement.

SA =Strongly Agree **A = Agree** **N = Neither Agree or Disagree**
D = Disagree **SD = Strongly Disagree** **N/A = Not Applicable**

1. After attending FIT, I feel prepared to integrate environmental education into my lessons.

   SA A N D SD N/A

2. The curriculum unit I prepared while at FIT has been useful to integrating environmental education into the curriculum.

   SA A N D SD N/A

3. Materials received from FIT have been useful in integrating environmental education into my curriculum.

   SA A N D SD N/A

4. Other teachers in my school have integrated environmental education into their curriculum as a result of my attending FIT.

   SA A N D SD N/A

5. The material presented at FIT was not what I was looking for in environmental education materials.

   SA A N D SD N/A

6. The material presented at FIT was useful for implementing environmental education into my lessons.

   SA A N D SD N/A

7. The material presented at FIT was not appropriate for my grade level and subject area.

SA A N D SD N/A

8. The material presented at FIT was at the appropriate level for my understanding.

SA A N D SD N/A

9. I did not have enough of a background in environmental education to understand the concepts being presented.

SA A N D SD N/A

10. What do you teach that is related to FIT?

____

____

____

____

11. Did you complete and return your curriculum unit you developed at the FIT workshop?

O Yes O No

If no, why? ___________________________________

____

____

____

____

Section IV - Barriers to Implementing Environmental Education in Existing Curriculum.

Using the alphabetical scales, please respond to each statement by circling the appropriate letter(s) following each statement.

SA =Strongly Agree **A = Agree** **N = Neither Agree or Disagree**
D = Disagree **SD = Strongly Disagree** **N/A = Not Applicable**

1. Lack of time in school day has been a barrier to implementing environmental education into existing lessons

   SA A N D SD N/A

2. A lack of preparation time has been a barrier to implementing environmental education into existing lessons

   SA A N D SD N/A

3. A lack of administrative support has been a barrier to implementing environmental education into existing lessons

   SA A N D SD N/A

4. My own lack of natural science knowledge has been a barrier to implementing environmental education into existing lessons.

   SA A N D SD N/A

5. My class size is too large to implement environmental education into existing lessons.

   SA A N D SD N/A

6. My class curriculum has no connection to environmental education.

   SA A N D SD N/A

7. A lack of accessible natural environments in our area is a barrier to integrating environmental education activities.

SA A N D SD N/A

8. The environmental education topics are not relevant to what I teach.

SA A N D SD N/A

9. A lack of interest on my part is a barrier to implementing environmental education into existing lessons.

SA A N D SD N/A

10. A lack of student interest is a barrier to implementing environmental education into existing lessons.

SA A N D SD N/A

11. A lack of community interest is a barrier to implementing environmental education into existing lessons.

SA A N D SD NA

12. A lack of follow-up from FIT coordinators is a barrier to implementing environmental education into existing lessons.

SA A N D SD N/A

13. Failure of previous lesson(s) is a barrier to implementing environmental education into existing lessons.

SA A N D SD N/A

14. A lack of available funding is a barrier to implementing environmental education into existing lessons.

SA A N D SD N/A

Section V – Improving FIT Workshops

Using the alphabetical scales, please respond to each statement by circling the appropriate letter(s) following each statement.

SA =Strongly Agree **A = Agree** **N = Neither Agree or Disagree**
D = Disagree **SD = Strongly Disagree** **N/A = Not Applicable**

1. FIT workshops should be offered during other parts of the year. (ie. spring break).

   SA A N D SD N/A

2. FIT workshops should be offered in more centralized locations of the state.

   SA A N D SD N/A

3. The length of FIT workshops should be:

   O Extended O Shortened O Left as it is

4. The number of guest speakers presenting at FIT should be:

   O Increased O Reduced O Left as it is

5. The amount of time to work on curriculum units should be:

   O Increased O Reduced O Left as it is

6. The amount of time dedicated to field trips should be:

   O Increased O Reduced O Left as it is

7. I would prefer commuting to a FIT workshop closer to my home than travel to a resident camp.

SA A N D SD N/A

8. How can the content of the FIT Workshop be improved?

____

____

____

9. I would apply to attend an advanced or second year FIT workshop if it was offered.

SA A N D SD N/A

10. What topics would you like to see covered in an advanced FIT workshop?

____

____

____

Section VI - Demographic Information of Participants

My gender is: O Male O Female

My age is: __________

Number of years teaching: __________

My highest level of education is: ______________________

My degree is in ______________________________

What grade level do you teach? ___________ O I do not teach.

What subject area do you teach?

____

Where do you teach?

- O Metropolitan Area (population of 100,000 or more)
- O Urban (population of 50,000 - 99,999)
- O Suburban (population of 15,000 - 49,999)
- O Town (population of 10,001 - 14,999)
- O Rural (population of less than 10,000)

Do you belong to any conservation organizations?

O No
O Yes
If yes, please list ________________________________

When and where did you attend a FIT summer workshop?
(Please check date and location)

O 1999	O 1995	O Camp Latieze, Shasta Co.
O 1998	O 1994	O Humboldt State University, Humboldt Co.
O 1997	O 1993	O U.C. Forestry Camp, Plumas Co.
O 1996		O Whiskeytown Environmental School, Shasta Co.

This completes the questionnaire. Thank you for your participation. Please use the attached adhesive tape to seal and mail back this form.

195

Ed Franklin
448 Ag Hall
Stillwater, OK 74078-6031
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APPENDIX B

AGRICULTURE STUDENT QUESTIONNAIRE

OKLAHOMA STATE UNIVERSITY

OSU

Division of Agricultural Sciences and Natural Resources
Department of Agricultural Education, Communications
and 4-H Youth Development
448 Agriculture Hall
Stillwater, Oklahoma 74078-6031
405-744-8036, FAX 405-744-5176

February 4, 2000

First Last Name
Agriculture Department
Name of High School
Address
City, State, Zip

Dear Instructor:

As per our telephone conversation, I am conducting research to determine the forestry and environmental knowledge and attitudes of California agriculture education students and their instructors. This is a part of a larger study to evaluate the Forestry Institute for Teachers. As you and your program have been involved in forestry/natural resource instruction, you and your students have been selected to participate in this research study.

Please find enclosed in this packet the following materials:

Instruction sheet (Yellow)
Teacher Survey (Blue)
Student Questionnaires (White) 20 copies
Pre-addressed stamped envelope

The questionnaire takes approximately 25 –30 minutes to complete.

I appreciate your participation in my research. As the findings will be reported in-group form, there will be no way to link responses to individuals or schools. The information will be used to assist the planners of the Forestry Institute for Teachers to determine if Agriculture students of teachers who have completed FIT-training will benefit from the forestry and environmental instruction.

Thank you in advance for your assistance. If you should have any questions, please feel free to contact me. I have enclosed a card for your reference.

Respectfully,

Edward A. Franklin
Project Researcher

Survey Instructions

Dear Instructor:

Thank you for agreeing to participate in this study. Included in this packet are student questionnaires, a teacher questionnaire, a return envelope, and this instruction form. The following instructions are to assist you in administering the questionnaire to your students. There are twenty-five (25) copies in this packet. If you should need more, please feel free to make additional copies. You may return unused copies.

Instructions for Completing Student Environmental Knowledge and Attitude Questionnaire.

Please distribute the questionnaires to your students.

Have students open the cover and complete the information on the top left page under "Personal Information". They will need to check off their gender, indicate their grade level and check the best descriptor of where they reside. Have students indicate the name of the class where they are taking this survey.

There are questions on both sides of the pages. Please do not skip a question. If a student does not know the answer to the question, they may circle choice "E. Don't Know"

If students need help in reading questions please assist, however, the responses must be from the student. Please have students' complete questionnaire using a pencil and work independently.

Knowledge Section: Students are to read each question and circle the letter (A, B, C, D or E) of the appropriate answer. If they do not know the answer, please circle letter "E". Students should work individually on these questions.

Attitude Section: Students are to read each statement and circle the letter(s) (SA, A, N, D, or SD) of the response they feel best describes how their attitude about the statement.

Teacher Survey (Blue Copy): While the students are completing the questionnaire, please take the time to complete the teacher copy and submit it. It will be used to compare students to teachers. Disregard the "Grade" question. You are asked to write in "Teacher".

Please complete the following and return with completed student and teacher questionnaire in the enclosed self-addressed stamped envelope.

Name of school ______________________________

Name of class ______________________________

Number of students completing questionnaire ___________

Number of male students completing questionnaires: ________
Number of female students completing questionnaire: ________

Thank you for your participation. Please place completed questionnaires and this form in the enclosed self-addressed envelope and drop into the mail.

Environmental / Forestry Education Student Survey

To the Student:

Your class has been selected to participate in a special project. In order for others to learn more about you, a short questionnaire has been specially developed. Your participation in filling out this questionnaire is completely voluntary. The information will be used to inform others about your knowledge and attitudes of environmental and forestry education. Please do not include your name or other identifying information on the questionnaire. Your responses will remain completely confidential.

Please read each question carefully and answer to the best of your ability. Once you have completed the questionnaire, please raise your hand so it may be collected.

Department of Agricultural Education, Communications, and 4-H Youth Development
College of Agricultural Sciences and Natural Resources
Oklahoma State University
Stillwater, OK 74078

Environmental / Forestry Education Survey

PERSONAL INFORMATION:

1) My gender is: _____ Male _____ Female

2) My Grade Level is: ______ (7^{th}, 8^{th}, 9^{th}, 10th, 11^{th} or 12^{th})

3) I live:

_____ in a Metropolitan Area (population of 100,000 or more)
_____ in an Urban Area (population of 50,000 - 99,999)
_____ in a Suburban Area (population of 15,000 - 49,999)
_____ in a Town (population of 14,999 or less)
_____ on a farm or ranch
_____ in the country, but not on a farm or ranch.

4) What is the name of this Agriculture course?

____

ENVIRONMENTAL KNOWLEDGE:

Please read each question and circle the best answer

1. There are many different kinds of animals and plants, and they live in many different types of environments. What word is used to describe this idea?

   a) multiplicity b) biodiversity c) socio-economics d) evolution e) don't know

2. Which of the following is a renewable resource?

   a) oil b) iron ore c) trees d) coal e) don't know

3. Which of the following household materials is considered hazardous waste?

   a) plastic packaging b) glass c) batteries d) spoiled food e) don't know

4. What are range land plants that thrive under heavy grazing called?

   a) increasers b) decreasers c) climax grasses d) noxious grasses e) don't know

5. What are animals and people that feed on plants and other animals called?

   a) consumers b) decomposers c) producers d) increasers e) don't know

6. From what source of power does most of the electricity in the United States come from?

a) hydropower b) geothermal c) nuclear d) fossil fuel e) don't know

7. What is an organism that feeds on both plants and animals called?

a) carnivore b) herbivore c) omnivore d) decomposer e) don't know

8. What is the upper limit of the population of a given species in an ecosystem called?

a) biotic limit b) climax succession c) carrying capacity d) huntable surplus e) don't know

9. What major factor is responsible for biomes (besides precipitation)?

a) geography b) soil condition c) temperature d) life forms e) don't know

10. Forestland in California makes up approximately how much of the total land area of the state?

a) 25% b) 30% c) 40% d) 50% e) don't know

11. What element makes up almost 80% of the earth's atmosphere in its gaseous state?

a) carbon b) oxygen c) hydrogen d) nitrogen e) don't know

12. What is one of the biggest causes of wildfire in this country?

a) campers b) debris burning c) smokers d) logging activity e) don't know

13. All living things are made up of about how much water?

a) 90% b) 80% c) 70% d) 60% e) don't know

14. What part of the soil acts as a sponge to hold water in place?

a) mineral matter b) organic matter c) parent material d) air pockets e) don't know

15. What type of rock forms when magma cools and hardens?

a) alluvial b) sedimentary c) metamorphic d) igneous e) don't know

This completes the Knowledge portion of the student survey. Please turn the page and complete the Attitude Assessment.

ENVIRONMENTAL ATTITUDE:

Please read each statement carefully, then circle a response based on your feelings or attitudes. There are no right or wrong answers.

		Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
1.	The balance of nature is very delicate and easily upset.	SA	A	N	D	SD
2.	Humans have the right to modify the natural environment to suit their needs.	SA	A	N	D	SD
3.	Farmers should be held responsible for any damages to the environment.	SA	A	N	D	SD
4.	Fires in the forest are destructive and should be prevented at all cost.	SA	A	N	D	SD
5.	A forest that is managed for timber production has little value for other purposes such as recreation, wildlife and pure water.	SA	A	N	D	SD
6.	Some wilderness areas should be preserved from development no matter how much money it costs.	SA	A	N	D	SD
7.	The most important use of California's forestland is to produce game and fish for sportsmen.	SA	A	N	D	SD
8.	The future of California's forestlands is dependent upon stopping logging.	SA	A	N	D	SD
9.	Grazing livestock on forestlands has a negative impact on the environment.	SA	A	N	D	SD
10.	I would have a problem with drinking recycled water.	SA	A	N	D	SD
11.	There is little difference in how forested lands are managed by the National Park Service and the United States Forest Service.	SA	A	N	D	SD
12.	I would allow logging on my property to make money.	SA	A	N	D	SD
13.	Animals that provide meat for people are the most important to protect.	SA	A	N	D	SD
14.	Forests are for people and should be managed to provide all goods and services, timber, water, recreation, etc.	SA	A	N	D	SD
15.	I feel hunting and fishing benefit the balance of nature.	SA	A	N	D	SD
16.	Rivers should not be dammed to construct reservoirs or lakes.	SA	A	N	D	SD
17.	Private land owners have more freedom to remove timber from their property than do publicly managed lands.	SA	A	N	D	SD
18.	I feel logging practices are beneficial to the forest ecosystem.	SA	A	N	D	SD
19.	I feel individuals should be allowed to use private land for any purpose.	SA	A	N	D	SD
20.	All plant and animals play an important role in the environment	SA	A	N	D	SD
21.	Landowners should be allowed to drain wetlands/swamps for agricultural or industrial uses.	SA	A	N	D	SD
22.	I feel people's jobs are more important than protecting the home of endangered plants or animals.	SA	A	N	D	SD
23.	Industries should be held financially responsible for any pollution that they cause.	SA	A	N	D	SD
24.	Wild animals that are dangerous to humans should be destroyed.	SA	A	N	D	SD
25.	Horseback riding causes damage to hiking trails and should be prohibited.	SA	A	N	D	SD
26.	More forestland should be set aside for wilderness preserves.	SA	A	N	D	SD
27.	Off-road vehicles are not damaging to the environment.	SA	A	N	D	SD

APPENDIX C

COVER LETTERS

OKLAHOMA STATE UNIVERSITY

OSU

Division of Agricultural Sciences and Natural Resources
Department of Agricultural Education, Communications
and 4-H Youth Development
448 Agriculture Hall
Stillwater, Oklahoma 74078-6031
405-744-8036, FAX 405-744-5176

February 18, 2000

Dear

I am conducting research designed to determine the extent of teachers' use of environmental education materials obtained from a Forestry Institute for Teachers (FIT) workshop. As a graduate of the Forestry Institute for Teachers (FIT), you have been selected to participate in an important research study. I value your opinion; therefore, you have been specially selected to be included in this research effort.

Please complete the enclosed questionnaire. The questions are designed to determine the frequency of use of FIT materials, how they are used in the classroom, barriers to integrating FIT activities, and suggestions for improving FIT workshops. Completing the questionnaire should require no more than 20 minutes. After completing the questionnaire, simply seal the booklet with the attached adhesive label and drop it in the mail. No return envelope is required.

Please be assured that your responses to this survey will remain confidential; no individual will be identified with his or her responses. A number on the questionnaire is a code so that I may identify those who have responded. This is to reduce the expense of follow-up and to eliminate the duplication of mailings to those participants who have returned the questionnaire.

Your response is very important to the success of this evaluation. The information you provide will be used to assist the planners of the Forestry Institute for Teachers to evaluate the effectiveness of the program and to improve future workshops.

I very much appreciate your completing and returning the questionnaire by **March 3, 2000**.

If you should have any questions, please feel free to contact me at (405) 744-6942 between 8:00 am and 5:00 pm (C.S.T.) or on-line at frankea@okstate.edu. Thank you again for your cooperation and participation!

Sincerely,

Edward A. Franklin
Project Researcher
Quincy '94 Alum

OKLAHOMA STATE UNIVERSITY

OSU

Division of Agricultural Sciences and Natural Resources
Department of Agricultural Education, Communications
and 4-H Youth Development
448 Agriculture Hall
Stillwater, Oklahoma 74078-6031
405-744-8036, FAX 405-744-5176

February 14, 2000

Dear

As a graduate of the Forestry Institute for Teachers (FIT) you have been selected to participate in an important research study.

In a few days you will be receiving a questionnaire in the mail. The questions are designed to determine how teachers use FIT materials and activities, benefits from the use of FIT materials, and barriers to adoption or implementation of environmental education activities in the classroom. Demographic questions are developed to enable the FIT staff to determine what teachers are best served by the FIT experience.

Information gathered from the questionnaire will be presented to the FIT administrative staff to aid in improving future workshops and activities. Your responses to this survey will be confidential; no individual will be identified with his or her responses. A number on the questionnaire is a code so that I may identify those who have responded. This is to reduce the expense of follow-up and to eliminate duplicate mailings to survey participants.

Your response is very important to the success of this evaluation. The information you provide will be used to assist the planners of FIT to evaluate the effectiveness of the program. Completing the questionnaire should require no more than 20 minutes. After completing the questionnaire, simply seal the booklet with the attached adhesive tape and drop it in the mail.

I very much appreciate your completing and returning the questionnaire by **March 3, 2000**.

If you have not received a questionnaire within a week or have any questions, please feel free to contact me at frankea@okstate.edu or call (405) 744-6942 between 8:00 am and 5:00 pm (C.S.T.). Thank you in advance for your assistance and participation!

Sincerely yours,

Edward A. Franklin
Project Researcher
Quincy '94 Alum

OKLAHOMA STATE UNIVERSITY

OSU

Division of Agricultural Sciences and Natural Resources
Department of Agricultural Education, Communications
and 4-H Youth Development
448 Agriculture Hall
Stillwater, Oklahoma 74078-6031
405-744-8036, FAX 405-744-5176

March 21, 2000

Dear

Please enjoy a cup of tea on me while taking the time to complete this questionnaire evaluating the Forestry Institute for Teachers. You have been selected to be included in this research effort because I value your opinion. The questionnaire is self-mailing; no envelope or stamp is needed!

Please be assured that your responses to this survey will remain confidential; no individual will be identified with his or her responses. A number on the questionnaire is a code so that I may identify those who have responded.

I very much appreciate your completing and returning the questionnaire as soon as possible. If you should have any questions, please feel free to contact me at (405) 744-6942 between 8:00 am and 5:00 pm (C.S.T.) or on-line at frankea@okstate.edu.

Thank you again for your cooperation and participation!

Sincerely,

Edward A. Franklin
Principal Researcher
FIT '94 Alum

APPENDIX D

REMINDER POSTCARD

Edward A. Franklin
Forestry Institute for Teachers Evaluation Study
Dept. of Agricultural Education, Comm. & 4-H
Oklahoma State University
448 Agricultural Hall
Stillwater, OK 74078-6031

Forestry Institute for Teachers

Dear FIT Graduate:

A few weeks ago you received a questionnaire from Oklahoma State University asking for your participation in a very important study about the Forestry Institute for Teachers (FIT). To date we have not received your response. It is very important that we include your opinions in our study. If you have already responded, thank you for your help, and please excuse this card. If you have not responded, won't you please take a moment now to do so? If you require additional information, please contact Ed Franklin at (405) 744-6942 or on-line at frankea@okstate.edu

Thank you for your assistance!

Ed Franklin
Principal Researcher

APPENDIX E

OBJECTIVE TWO: RESPONSES TO OPEN ENDED

QUESTION, "WHAT ACTVITIES DO YOU USE MOST OFTEN

WITH YOUR STUDENTS?"

Section III Integrating Environmental Education into your Curriculum

Question #10 What activities do you use most with your students?

Activities	Most Frequent
Project Learning Tree	45
Project WILD	26
Tree Cookies	20
Tree identification	12
Water-related activities	12
Curriculum Unit	10
Fire-related activities	7
Soil-related activities	7
Food Web	6
Aquatic WILD	5
Recycling	5
Adopt a Tree	2
Adopt a Watershed	2

APPENDIX F

OBJECTIVE FOUR: RESPONSES TO OPEN ENDED QUESTION, IMPROVING CONTENT OF FIT WORKSHOPS AND SUGGESTED TOPICS FOR FIT II WORKSHOP

Responses to Open End Questions Section V

Question 8
How can the content of the FIT Workshop be improved?

Theme: Follow-Up

"Offer a 2nd course for teachers who want more information – maybe offer FIT A at one location and FIT B at another."-'99 Humboldt

"Follow up 1 or 2 days during the school year." – '93 UC Forestry Camp

"Workshops with past attendees." –'94 UC Forestry Camp

"Return past teachers as trainers to help field classroom logistic questions."-99 UC Forestry Camp

"Have past FIT members showcase activities!" –'93 UC Forestry Camp

"Think they should ask FIT students to return to revitalize curriculum. Follow-up would be great." – '94 UC Forestry Camp

"Extend to part II, carry over." –'99

"More collaboration between teachers & staff." –'97 UC Forestry Camp

"How about an opportunity to interact?" –'97 Humboldt

"Follow-up internship that teachers sign up for?"-'99 Humboldt

"Case studies from past partcipants."-'95 UC Forestry Camp

"I would like follow-up support on persuing (sic.) grants for projects – perhaps a mini reunion with local FIT participants." –'99 Camp Latieze

"More follow-up." –' UC Forestry Camp

Theme: Time

"It's great as it is. Perhaps a bit too intense at the beginning. Could use a bit more time to digest all the information." – '99 UC Forestry Camp

"More time to make samples to take to classroom." – '98 Camp Latieze

"Lengthened to allow all of that info to "soak in." Once I return to "reality" I have family, career, community service, recreational responsibilities, and needs to see to. Review while at FIT would be great. Brainstorming on individual presentations would be useful as would more time on campus with materials." – '96 Humboldt

"Don't cover too much each day. Give teachers time to digest the materials and ideas." – '99 UC Forestry Camp

"Sometimes I was swamped by too much information." –'93 Humboldt

"There is a lot of info crammed into a week, but longer workshop would be too long and the info just won't fit into less time." –'99 Humboldt

"More time to study materials at camp." –'99 UC Forestry Camp

"Less intensity – more of a chance to synthesize material. Great workshop though." –'95 Humboldt

"It was great. Needed more time, my only complaint." –'97 Humboldt

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Theme: Satisfied with Present Format

"You folks do an excellent job." –'98 Camp Latieze

"It was fine!" –'95 Whiskeytown

"Nothing that I recall. I enjoyed it at it was!" – '94 Whiskeytown

"I like it."-'96 UC Forestry Camp

"The field trips and the speaker made the material especially relevant. Some team building earlier in the week would help strangers feel more united as a group." – '94 Whiskeytown

"I loved it just as it is." –'99 UC Forestry Camp

"The Quincy workshop was excellent. Please note – I may not use any particular curriculum from FIT by I do incorporate many of the concepts into my teaching. I found FIT to be very beneficial not only to my teaching but when talking with adults as well." – '98 UC Forestry Camp

"I have been to about 20 summer workshops and one (FIT) by far has been the best in regards to materials/books, help, field trips, samples, and the fun given. Not to mention good food!" –'98 UC Forestry Camp

"I think it was just great!" – '95 Whisktytown

"I was very pleased with its scope and depth." –'98 Humboldt

"I think it is fabulous as it is. I loved my week at FIT!" –'96 UC Forestry Camp

"Being in a beautiful natural area is the best part." –'93 UC Forestry Camp

"It was all very good." –'99 Camp Latieze

"It was excellent from start to finish." –'97 Humboldt

"It was excellent." –'96 UC Forestry Camp

"I would leave it as it is." –'93 UC Forestry Camp

"Not." –'97 Humboldt

"Honestly – I can't think of anything." –'98 UC Forestry Camp

"It was good and I learned a lot." –'95

Theme: Satisfied with Present Format (Continued)

"It can't way above average." –'99 Camp Latieze

"Perfect as is." –'93 UC Forestry Camp

"My experience with FIT was great as is!"-'97 Camp Latieze

"Not at all!" –'96 UC Forestry Camp

"I though it was excellent. No improvement necessary." – '99 Camp Latieze

"It was outstanding, I'm sure it could be improved but I don't know how." –'99 UC Forestry Camp

"I thought it was great as it was. I have had a lot of 4-H training in science related areas." – '99 UC Forestry Camp

"Fine with present workshop." –'99 Humboldt

"FIT was great experience. It should remain as is."-'99 Humboldt

"Already great." –' Camp Latieze

"It was great for me- I learned a lot."-'97 UC Forestry Camp

"The content was very good."-'96 UC Forestry Camp

"It was very beneficial." –'97 UC Forestry Camp

"It is excellent." –'98

"The teacher FIT program I attended was the most productive in my career."-'96 Camp Latieze

"I thought it was excellent as it was."-'95 UC Forestry Camp
"It was great – especially with break out groups at different grade levels."
–'99 Camp Latieze

"I was in the original "FIT 1" – I loved it."-93 UC Forestry Camp

"I thought the program at Quincy was outstanding! The best course I've ever taken!! Mike ran an outstanding forestry camp."-'95 UC Forestry Camp

"No change." –'96 Humboldt

Theme: Satisfied with Present Format (Continued)

"None needed!" – '96 Humboldt

"It was GREAT!!!" – '96 Camp Latieze

"I was in earlier workshops, so I don't know it has changed or improved." – '94 UC Forestry Camp

"Great as they are!" –'93 Whiskeytown

"I thought it was great as is." – '99 UC Forestry Camp

"I enjoyed an learned a great deal at the workshop. I left with a greater understanding of issues and was anxious to bring it my classroom." – '96 Humboldt

"Excellent the way it is." – '99 UC Forestry Camp

"Its great the way it is"- '99 UC Forestry Camp

"It was excellent – no change." –'96 UC Forestry Camp

"It was great!" –'98 Humboldt

"Can't." – '97

"It was wonderful. One of the best workshops I've attended." - Whiskeytown

"I can't think of any way to improve it. I thought it was great!!" – '95 UC Forestry Camp

" I felt that the workshop was an excellent program as it was" –''94 UC Forestry Camp

" It was very comprehensive. Keep the special activities!" –'99 UC Forestry Camp

"It was <u>very</u> good as presented at Humboldt 1999!!"-'99 Humboldt

"Felt it good as presented."-'97 UC Forestry Camp

"It met my needs." –'95 UC Forestry Camp

"I though it was great! The day trips & speakers & experts were beneficial."-'97 UC Forestry Camp

"I was pleased with the workshop." –' Whiskeytown

Theme: Satisfied with Present Format (Continued)

"I learned so much about forestry and I grew up near Quincy in the heart of the National Forest. FIT was a wonderful educational experience."-'98 Humboldt

"? I loved it the way it was." –'95 Whiskeytown

Theme: Curriculum Development Needs

"Participants should be able to tailor their unit to information given at FIT- Guest speakers etc. should present to the units." –'98 Camp Latieze

Children connected to presentation and conservation of the forest and animal life, how they can help be a part of the process."-'96 Humboldt

"It was excellent. Maybe some tree or plant identicfication."-'96 UC Forestry Camp

"More affordable materials." –'99 Camp Latieze

"Though Humboldt State was a great location, provide trade books (children's books) to support some the lessons." –'97 Humboldt

"Lesson sharing, lesson availability. So hard to say, FIT was probably the best workshop experience I've had. It was terrific!" – UC Forestry Camp

"Going through some of the activities in the issues book some more."-'98 Humboldt

"More training with project WILD activities – how to set up and use the classroom." – '98 Humboldt

"I thought I was great! May be more rotation through animal, plant, water, and bird biology labs with curriculum and lab activities." –'96 Camp Latieze

"Increase training in skills such as plant ID, aquatic analysis, soil classification…"-'95 UC Forestry Camp

"Grouping teachers with environmentalist (mentor) to over see and develop new work." – '95 Whiskeytown

"I liked and got a lot out of the content. More curriculum like CLASS, PLT …would be useful." – '97 UC Forestry Camp

"More time to work in groups on teaching units." –'94 Humboldt

"Include "A Child's Place in The Environment"." –'98 UC Forestry Camp

"Tie in to the State Science Standards – This will not be easy for the 6th grade and very difficult for 7th and 8th."-'95 Humboldt

"I thought it was good, though more emphasis could be placed on Deep Ecology, EcoLiteracy and Bio-regionalism for my tastes."-'93 UC Forestry Camp

"It could be connected to CA State Standards." –'95 UC Forestry Camp

Theme: Curriculum Development Needs (Continued)

"More time developing units of instruction." –'95 UC Forestry Camp

"More time for curriculum unit, more time to look over text materials." – '94 UC Forestry Camp

"Provide a lesson(s) there that could be shared. Adopt one from available sources. Thank you for a great experience. My week was a great change for the better. I wish we could keep all the various groups happy that wish to use the forest!" -'97 Humboldt

'"I think we should walk away with a unit and some prepared lessons written."-'98 UC Forestry Camp

"Align content to new science standards, math standards, LA standards, social studies standards." –'97 UC Forestry Camp

"More teacher units and projects that we can actually see." –'97 Humboldt

"I don't think it needs to be improved other than more time in the evenings to prepare curriculum. Once school starts I have very little time." – '98 UC Forestry Camp

"Include recycling"-'94 Whiskeytown

"Develop instructional units or activities with written materials that are better prepared to use."-'97 UC Forestry Camp
"A little more time to develop units" –'95 UC Forestry Camp

"More connections to history/social science, more connections to standards, more connections to urban forestry." –'96 UC Forestry Camp

"Align to State/District Standards, and how to apply content to Standards."-'94 UC Forestry Camp

"You do not address the present realities of standardized testing and/or recent CA State standards in this survey. I have not used many specific "Activities", but FIT changed my own views of teaching and my own understanding of environmental issues. FIT "broadened" my horizons in many areas. I feel, the impact of the FIT experience cannot be quantified by a survey."-'95 Whiskeytown

"Not so technical, hands-on with lesson plans."-'99 Humboldt

"More textbook review or information to accompany FIT activities." – '98 Humboldt

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Theme: Specific Grade Level Needs

"Suggestions about implementing FIT materials in to already established H. S. curriculum."-'96 Whiskeytown

"Find more activities for high school level classes." –'98 Humboldt

"More to grade level, kindergarten is not covered, difficult to relate."-'98 Humboldt

"Invite a minimum number of participants from each grade level. I believe I was the only K teacher. Collaboration can steer the content." –'96 UC Forestry Camp

"Work with people at your grade level (fellow participants) to share ideas on adopting."-'97 Humboldt

"I've been changed to 2^{nd} grade from 4^{th}, 5^{th} & 6^{th} grades so I need simpler stuff." –'93 UC Forestry Camp

"More challenging for high schoolers on a college tract."–'97 UC Forestry Camp

"Use of grade level literature to connect units to the curriculum." –'94 UC Forestry Camp

"Grades schools, middle schools and high schools need to meet separately" – '98 Camp Latieze

More support constructing a unit. Meet in grade level type groups. Foster cooperation rather than competition about units. Gather materials in Spanish." – '94 Humboldt

"Encourage whole staffs to attend or grade levels" –'94 Camp Latieze

"Higher level, faster pace, more advanced tech activities for high school."-'97 UC Forestry Camp

"Sometimes separate sections for elem./secondary. Use of a specific outline of contents to cover. Inclusion of some volunteer form activities. Some more content about other tree, citrus, apples, etc." –'97 UC Forestry Camp

"More segregated by grade level appropriateness ie. upper/lower elementary." – '99 Humboldt

" Provide grade-level appropriate workshop and integrate state standards into the curriculum unit." –'96 UC Forestry Camp

"More middle school curriculum presented."-'98

Theme: Specific Grade Level Needs (Continued)

"Grade level tie-ins have material TEST friendly (SAT 9)." –'98 Humboldt

"Reinforcing learned skills – and building knowledge horizontally." – "99 UC Forestry Camp

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Theme: Issues Related to Geographical Regions of the State

"I would like to learn more about using my local environment in teaching – chaparral & Oak woodlands." – '99 Humboldt

"Maybe some regional speakers who can talk to participants from their localities to speak of opportunities unique to their region." –'95 Humboldt

"Offer them in So. Cal." – '98 Humboldt

"Compare different type forests from other sites other than your own. (I attended Latieze, but would have benefited form learning something of the redwood forest)." – '96 Camp Latieze

"Using facilities/parks in our geographical area so that we can take field trips that are close to our school."-'98 Humboldt

"Use other locations throughout the state." –'96 UC Forestry Camp

"Perhaps connection to student experience for students in cities. Also more physical activities (hikes)." –'99 UC Forestry Camp

"More strategies for instruction on a urban school." –'98 Humboldt

"For me – I thought I would like a little more concrete tie-in to our area – suburbs have a different reality." –'97 UC Forestry Camp

"Divide them up by location in State where the teachers teach & divide them up by grade level." –'95 Humboldt

Would like to see more application to chaparral, even desert habitats. I really enjoyed my FIT class. Felt like I learned a lot. It really updated my knowledge of forestry practices, issues & ecosystems." –'99 Humboldt

"I teach in urban chaparral (not heavily forested area) and would have liked more resources tailored to my schools local environment." – '98 Camp Latieze

"Include chaparral forest." –'94 UC Forestry Camp

"I thought it was GREAT the way it was. I suppose there could be locally focused topics for Southern Calif., for example – but I loved getting to know issues in Eureka/Arcata." – '99 Humboldt

"Outreach to metro/urban schools means focus on there nearby native ecosystems. This could only be practiced if workshops were located in city." –'94 Whiskeytown

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Theme: Contrasting Viewpoints about Forestry Practices

"Too industry dominated. More grassroots environmentalism included." –'98 Humboldt

"Invite environmentalists, too, to provide opposing viewpoints; more time on Project Learning Tree, etc. to get fuller experience/training." – '98 Humboldt

"More balance of opinions." –'99 UC Forestry Camp

"I did not think the anti-environmentalist attitude of some the speakers was appropriate -- __________ especially."- '98 Humboldt

"Present more Sierra Club/Nature Conservancy etc. opinions."-'98 UC Forestry Camp

"I personally feel that the conservation and preservation issues were underplayed but that is understandable since the timber lobby is financing. One of the lumber companies hosted a delicious going away picnic buffet and barbecue the last day. Hidden behind the bushes around the property were the ghostly remains of the giant redwoods – rotting stumps (perhaps they don't rot?) 12 to 15 feet in diameter. I will never forget this haunting reminder." –'98 Humboldt

"It was a superb experience but I would like to see the no logging on more roads view presented." –'98 UC Forestry Camp

"Things may have changed since I attended – but the full spectrum of EE should be included i.e. include Nat. Wildlife Federation or Audubon materials & speakers."-95 Whiskeytown

"More contrasting view points about forestry practices. Less lumber co. influence." –'95 Whiskeytown

"I liked hearing both sides of the forestry maintenance issue."-'96

"I liked it and the balance of opinions."-'95 UC Forestry Camp

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Theme: Not Categorized

"It's been so long. I can't think of anything…" – '96 Humboldt

"Remove all the "education" stuff." – '94 UC Forestry Camp

"Stay the course, keep the topics current, stay practical and common sense." – '99 Camp Latieze

"Needs an assessment to see if participants digested all of the material other than just a curriculum unit developed." – '99 Camp Latieze

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Section V – Improving FIT Workshops

Question #10 What topics would you like to see covered in an advanced FIT workshop?

FIT participants responding to this section = 132

Theme: Fisheries /Wildlife/Plants/Fire/Geology/Recycling (n=39)

"Wildlife how it relates to the forest."-'99 Camp Latieze

"More emphasis on animal life."-'98

"Bio assessment (Macro invertebrate), calculating fuel loads in non-burn vs. burn areas!"-'93 UC Forestry Camp

"Survey of plant and animal populations. Stream studies (detailed). Environmental impact for students."-'99 Humboldt

"Biological info – like bugs and animals."-'99 UC Forestry Camp

"More biology topics." – 94 UC Forestry Camp

"Soil studies, tree ring studies connected with weather & history insect vs. plants (invasive, symbiotic..)."-'93 UC Forestry Camp

"Endangered species."-'99 UC Forestry Camp

"Animal tracking, hiking, use of areas for recreation, fishing, photo shoots, use of video cameras to show students."-97 Humboldt

"Freshwater ecology, animals and plants."-'99 Camp Latieze

"Pesticides, genetic engineering."-'94 Humboldt

"Possibly how to grow trees (ie. a tree farm)."-'95 UC Forestry Camp

"More animal preservation and relationships to forestry."-'96 Humboldt

"Tree/plant identification; classroom projects."-'96 UC Forestry Camp

Theme: Fisheries /Wildlife/Plants/Fire/Geology/Recycling (n=39) (Continued)

"Greater soil science/bio relationships animal impact (ranching) on land, forest, water."-'99 Humboldt

"Wildlife in-depth."-'99 UC Forestry Camp

"Habitat of oak trees, urban habitats (H.S. campus)."-'97 UC Forestry Camp

"Animal/insects of the forest."-'99 UC Forestry Camp

"More on fisheries?"-'99 Humboldt

"Local/native plant and animal identification, different forest ecosystems, different kinds of habitats."-'98 Humboldt

"Tree ID, disease, planting & harvesting."-'94 UC Forestry Camp

"More on Calif. wild animals, how forests effect weather."-'98 Humboldt.

"Wildlife, global impact."-'99 UC Forestry Camp

"Ca – Ecogeography."-'95 UC Forestry Camp

"Environmental protection in action."-'98 Humboldt

"Forest fires, species of plants and animals specific to Southern California Mountains, samples/copies of free stuff offered USFS, USGS."-'99 Camp Latieze

"More information on animals and plants (other than Redwood trees) that comprise CA forests."-'99 Humboldt

Planting and caring for a forest, how to best thin out a stand."-'94 UC Forestry Camp

"Life science, animals, environmental studies." –'98

"Wildlife management, resource management."-'96 UC Forestry Camp

"Endangered species."-'97 Humboldt

"A unit on plastics – this is a contemporary topic, and how it affect the environment."-'99 Humboldt

"Global ecology, recycling, international issues."-'95 Camp Latieze

"Recycling."- UC Forestry Camp

Theme: Fisheries /Wildlife/Plants/Fire/Geology/Recycling (n=39) (Continued)

"Math connections." –'94 Humboldt

"Talk about geology issues, forest soils, erosion." –'97 Humboldt

"More of geological aspect to environment."-'99

"Forestry careers, fire fighting, sustainable logging."-'93 UC Forestry Camp

"More focus on related careers, though there was already much of this."-'95 UC Forestry Camp

"Incorporate GLOBE activities Geology of the forest- plat tectonics earth quakes, mountain builidng."-'98 Humboldt

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Theme: Curriculum Development/Sharing of Teaching Resources (n=19).

"I'd like to up-date and fine tune my curriculum unit."-'96 Camp Latieze

"More emphasis on lesson design and curriculum planning – more direct experiences with the various curriculum available through FIT."-'99 Humboldt

"More hands on lessons ready to take back."-'99 Camp Latieze

"Natural science, plant biology for elem. level, more environmental lessons."-'99 UC Forestry Camp

"Reflect on follow-up, bring back experienced participants from other camps with units completed."-'94 UC Forestry Camp

"Sharing of what worked with other teachers. Choices and then in depth study in curriculum areas."-'94 UC Forestry Camp

"FIT Facilitator training for school or district."-'99 UC Forestry Camp

"I would like hear from people who have implemented units and find out what works well, and also about the activities they pulled together around various themes."-'99 Camp Latieze

"Review/extensions."-'99 Humboldt

"The Arbor Day Foundation has wealth of materials about trees as part of a school, home, or community & how to care for them. How they serve us.."-'94 Humboldt

"Reinforcing learned skills- and building knowledge horzontally."-'97 Humboldt

"More Project WILD, Learning Tree, Aquatic Wild activities, - I love everything about FIT!)."-'99 UC Forestry Camp

"Time to make samples, displays & teaching aids. Opportunity to teach some lessons on site. A chance to see other types of forest environments."-'98 Camp Latieze

"Ways to integrate FIT into <u>already</u> packed curriculum."-'97 Humboldt

"Review covered material & expand on forest health, clean water cycle. It was a lot of information to process in 1 week but it was great."-'97 UC Forestry Camp

"Recycling, training other teachers back at your school."-'94 Whiskeytown

"Resources (people) visiting from areas close to where I teach."-'96 UC Forestry Camp

Theme: Curriculum Development/Sharing of Teaching Resources (n=19).
(Continued)

"Different aspects of environmental education."-'99 UC Forestry Camp

"FIT Facilitator training for school or district."-'99 UC Forestry Camp

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Theme: State Standards (n=16)

"For elementary teachers" how to integrate FIT/environmental ed. activities into standard curric: math language arts (These two normally take up to 75% of teaching day)(hands-on)."-'94 Whiskeytown

"Tie the curriculum to current state standards and give more time to explore the forests."'-99 UC Forestry Camp

"How to incorporate in current curriculum & state standards – share curriculum units mat first workshop."-'98 UC Forestry Camp

"Ties to science standards."-'97 UC Forestry Camp

"More on standards – how to implement."-'97 Camp Latieze

"Grade level topics related to the State science standards."-'98 UC Forestry Camp

"California State Standards – Implementing lessons that directly teach to the Standards."-'98 UC Forestry Camp

"Using state standards in all academic areas for more integration across the curriculum."-'96 UC Forestry Camp

"Relate to middle school, new state science standards."-'96 UC Forestry Camp

"Check out State Standard requirements for each grade level."-'98 Camp Latieze

"Application to all content area standards leadership training to take training to districts."-'99 UC Forestry Camp

"Provide topics that are related to CA State Standards and allow participants time to work on the unit at FIT. Provide resources and materials for the unit."-'96 UC Forestry Camp

"Standards connected to curriculum, urban forestry, environmental ethics."-'96 UC Forestry Camp

"Share units created – get them fine tuned."-'99 UC Forestry Camp

"1. Coordinating lesson/unit to new Calif. Science Standards, 2. So. Cal issues."-'98 Camp Latieze

"Specific lessons tied to the new State Standards in Science. May be different grade levels could be divided, or focus on common themes and present lessons that could be modified for different level."-' UC Forestry Camp

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Theme: Forestry Issues/Politics/Economics/Management (n=15)

"Land management practicies."-'99 Humboldt

"More in-depth forestry issues."-'98 Humboldt

"Economics, higher level thinking skills."-'97

"Politics."-' UC Forestry Camp

"Radical environmentalism."-'98 Humboldt

"Extension of forestry."-'95 UC Forestry Camp

"More political dynamics, more historical background of land use, some geology – everything begins with soils."-'97 Humboldt

"Current controversial issues in environmental science, high school curriculum."-'96 Camp Latieze

"Political ramifications, monetary influences, future sources."-'99 Camp Latieze

"The role of the industry to support select cutting, reforestation efforts, and stream habitat reconstruction."-' UC Forestry Camp

"More of the above including more speakers representing conservation and preservation of forests, particularly the redwoods and sequoias."-'98 Humboldt

"Dialogue between environmental groups of forestry. I'd lie to learn about tree canopies."-'98 UC Forestry Camp

"Working with local officials, collaborating with environmental groups, urban creek restoration. More urban issues!"-'99 UC Forestry Camp

"More connections to Native Americans and their environmental practices may be. I think the first one covered a lot!"-'95 Humboldt

"More Indian/environmental views"-'98 UC Forestry Camp

Theme: Address Specific Grade Levels (n=9)

"More hands-on activities for H.S. that can be used in the classroom." –'99 Humboldt

"Specifics on adopting for middle schools unable to go on field trips."-'95 Whiskeytown

"For K-2 grades."-'93 UC Forestry Camp

"Topics are fine- need ideas from and experienced person on appropriate for K-1 age students."-'93 UC Forestry Camp

"Divide into elementary and secondary, more lab type, hands-on time."-'99 Camp Latieze

"I would like to see a sharing of units and ideas at my primary grade level like we had when we visited that schoolsite!"-'97 Humboldt

"It would be nice to have hands-on lessons. I would be interested in another workshop not too advanced – for grades 4-6."-'95 UC Forestry Camp

"Secondary level topics only." –'96 Humboldt

"Grade level and area/geographic appropriate materials."-'95 Humboldt

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Theme: Watershed, water quality, stream study (n=8)

"More river/water info & exploration."-'98 Humboldt

"Stream trips, walks in forest with foresters."-'99 Humboldt

"I would like to see specific aspects offered such as wetlands/ watersheds/ social forestry/ forest to careers/ rivers/ waterways etc. This would be in order to focus specifically on a topic and obtain needed background knowledge in order to teach it properly."-'98 UC Forestry Camp

"More stream ecology – watersheds, alternative energy sources and projects, how these and other components of FIT match up the new CA Standards." –'98 Humboldt

"Rahabbing (sic.) a stream, and rehabbing an empty lot."-'99 Humboldt

"Stream watershed management, geology."-'97 UC Forestry Camp

"A short review of previous lessons and extensive study on the same topics. Discussion of specimens found in local water sources. Make comparative study and write conclusions about the make up of pH, pollutants, observable location features.."-'99 UC Forestry Camp

"Water preservation, grassland, marsh, ecology, reforestation."-'96 UC Forestry Camp

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Theme: Ecosystems (n=7)

"More coverage of other parts of forest habitat than just trees – streams, soil, landscape, (flat, mountainous) etc..”-'96 Camp Latieze

"Other ecosystems – deserts, savanha, etc..”-'98 Humboldt

"Chaparral.”-'95 Humboldt

"Ecosystems sampling methods that could be used by studnts.”-'97 UC Forestry Camp

"Calif. has tremendous opportunity to experience eco-diversity. Why not a wee w/traditional FIT I type info and a few days on the road for alpine to beach ecosystem caravan. Monterey bay to Mono lake = Coastal, coast range, Central Valley, Sierra Foothills, Yosemite Valley, Tuolumne meadow, Tioga Pass, Mono lake.”-'96 Humboldt

"Go more in depth into the biology of forest systems: carbon cycle, nitrogen cycle, micro algae, etc. how about urban forestry?”-'99 Humboldt

"Desert ecology, coastal ecology.”-'99 Camp Latieze

Theme: Student Activities (n=7)

"Additional literature, building a community project."-'94 UC Forestry Camp

"Projects useable by local community."-'95 Whiskeytown

"Train student teams for CA Envirothon, FFA forestry and natural resources teams, range management."-'95 UC Forestry Camp

"Air/water pollution chemical monitoring- cheap ways to incorporate chemistry/ simple math."-'93 Whiskeytown

"Practical skills in plant ID, soils, geology, aquatic analysis, training for CA State Envirothon."-98 Humboldt

"Long term experiments possible to be complete with a teacher who teachers 6 periods a day, 30 students per 49 minute period."-'95 Whiskeytown

"Possibly an in-depth study or extended study of how to involve student's in service learning."-'93 UC Forestry Camp

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Theme: Technology (n=6)

"Use of GIS Systems."-'99 Humboldt

"Technology in forestry, and science, careers and futures in the woods, etc."-'97 Humboldt

"High tech – GPS, GIS, computers, remote sensing."-'97 UC Forestry Camp

"How technology has helped forestry, genetic engineering of forest plants, more on watershed areas, what's happening at other national forests."-'98 UC Forestry Camp

"Biotech application (superior seed etc.) Cross-discipline management strategies (fisheries, forestry, game management, recreation)."-'95 Humboldt

"Future innovations."-'97 UC Forestry Camp

Theme: Not Specific (n=5).

"More of the same info." –'98 Humboldt

"More of the same." –'99 UC Forestry Camp

"Not interested." –'96 UC Forestry Camp

I don't know (I'm not interested in av. FIT.)"-'95 UC Forestry Camp

"I'm open."-'97 UC Forestry Camp

Theme: Fundraising/Grantwriting (n=3)

"Grant writing workshops, recycling, wilderness areas."-'95 Whiskeytown

"Grant writing, preparing a draft, meeting deadlines, etc. perhaps a mentor program for follow-ups."-'99 Camp Latieze

"Funding sources for field trips, different types of forests (ex. Rainforests)."-'99 UC Forestry Camp

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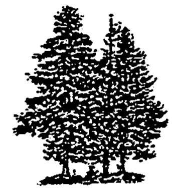
APPENDIX G

FIT WORKSHOP SPONSORS

FORESTRY INSTITUTE FOR TEACHERS 1997 SUPPORTERS



Barnum Timber Company
Attn: Mr. Robert Barnum
P. O. Box 1365
Eureka, CA 95502

Blue Lake Forest Products
Attn: Bruce Taylor
1619 Glendale Drive
Arcata, CA 95521

Burney Forest Products
35586-B HWY 299 East
Burney, CA 96013

California Cedar Products
P. O. Box 528
Stockton, CA 95201

California Department of Forestry
Attention: Mr. Bruce Turbeville
P. O. Box 944246
Sacramento, CA 94244-2460

California Department of Fish and Game
1416 Ninth Street,13th Floor
Sacramento, CA 95814

City of Arcata
Attn: Mark Andre
736 F Street
Arcata, CA 95521

Collins Pine Company
Attn: Larry Potts
P. O. Box 796
Chester, CA 96020

Crane Mills
Attn: Frank Barron
P. O. Box 318
Corning, CA 96021

Chris Grover
405 Enfrente Dr.
Novato, CA 94949

Del Norte County Office of Education
301 W. Washington Blvd
Cresent City, CA 95531

Fruit Growers Supply Company
Fruit Growers Road
Hilt, CA 96044

Hancock Timber Resource Group
Attn: Jim Cathcart
1 S.W. Columbia, Suite 1720
Portland, OR 97258

Hudson ICS
P. O. Box 2338
San Leandro, CA 94577

Humboldt County Office of Education
825 5th Street
Eureka, CA 95501

Incense Cedar Institute
P. O. Box 7349
Stockton, CA 95267

Louisiana-Pacific Corporation
Attn.: Michael Alcorn
1508 Crannell Road
Trinidad, CA 95570

Pacific Logging Congress
2300 Southwest 6th Ave., #200
Portland, OR 97201

Pacific Lumber Company
Attn: John Campbell
P. O. Box 37
Scotia, CA 95565

Pacific Meridian
Attn.: Ms. Kass Green
5915 Hollis Street, Bldg B
Emeryville, CA 94608

Plumas County Office of Education
Attn.: Mr. Bill Cottini
P. O. Box 10330
Quincy, CA 95971

Redwood Empire
Attn: Mr. Roger Burch
P. O. Box 1394
Cloverdale, CA 95425

Redwood Regional Conservation Council
P. O. Box 2045
Fort Bragg, CA 95437

Redwood Region Logging Conference
Attn: Ms. Claudia Lima, Executive Director
Eureka, CA 95501

Sierra Cascade Logging Conference
Attn: Ron Monk
P. O. Box 1536
Chester, CA 96020

Sierra Pacific Industries, Quincy Division
P. O. Box 28
Quincy, CA 95971

Sierra Pacific Industries Foundation
Attn: Carolyn Dietz
P. O. Box 496028
Redding, CA 96049

Simpson Timber Company
Attn: Jim Brown
P. O. Box 1089
Arcata, CA 95518

Ultra Power III, Blue Lake
Attn: Gary Leonard
200 Taylor Way
Blue Lake, CA 95525

U. S. Forest Service
Resources Conservation Education Program
630 Sansome Street
San Francisco, CA 94111

U. S. Forest Service
Plumas National Forest
P. O. Box 11500
Quincy, CA 95971

U. S. Forest Service
Attn: Mr. Bill Pidanick
Six Rivers National Forest
1330 Bayshore Way
Eureka, CA 95501

W. M. Beaty & Associates
P. O. Box 990898
Redding, CA 96099

Southern California Edison
Attn: Jennifer Bastian
P. O. Box 800
Rosemead, CA 91770

Sierra Cedar Products
Attn: Jonathan Shinn
1401 Melody Road
Marysville, CA 95901

Timber Counties Schools Coalition
c/o Dr. Charles Menoher
1644 Magnolia Ave.
Redding, CA 96001

U. C. Cooperative Extension
DANR - North Region
Davis, CA 95616-8575

APPENDIX H

INSTITUTIONAL REVIEW BOARD

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Date: December 9, 1999 IRB #: AG-00-049

Proposal Title: "AN ASSESSMENT OF THE CALIFORNIA FORESTRY INSTITUTE FOR TEACHERS"

Principal Investigator(s): H. Robert Terry, Edward Franklin

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature:

Carol Olson

Carol Olson, Director of University Research Compliance

December 9, 1999
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

VITA

Edward Albert Franklin

Candidate for the Degree of

Doctor of Philosophy

Thesis: AN EVALUATION OF THE CALIFORNIA FORESTRY INSTITUTE FOR TEACHERS

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Castro Valley, California, February 17, 1961, the son of Edward Chesley and Maxine Mae Franklin. Married Jennifer Lee Welsh on March 26, 1988. Father of Megan Elizabeth and Austin Edward.

Education: Graduated from Atwater High School, Atwater, California, June, 1979; received Bachelor of Science from California State University, Chico, May, 1984, with a major in Agriculture; received a Master of Science from California Polytechnic State University, San Luis Obispo, September, 1998, with a major in Agriculture; completed the requirements for the Doctor of Philosophy degree in Agricultural Education at Oklahoma State University in July 2000.

Professional Experience: Vocational Agriculture Instructor, Yosemite Union High School District, Oakhurst, California, 1986-1991; Agriculture Technology Instructor, Central Unified School District, Fresno, California, 1991-1998; Graduate Teaching Associate, Oklahoma State University Department of Agricultural Education, Communications, & 4-H Youth Development, 1998-2000.

Professional Memberships: Association of Career and Technology Education, California Agriculture Teachers Association, National Association of Agricultural Educators, American Association for Agricultural Education, Agricultural Education Graduate Student Association.