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Mississippi Teachers' Environmental Awareness and Usage of the Project Learning Tree Curriculum within Traditional Classrooms

Kimberly Nicole Carroll

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Mississippi teachers' environmental awareness and usage of the Project Learning Tree

curriculum within traditional classrooms

By

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A Thesis
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Masters of Science
in Forestry
in the Department of Forestry

Mississippi State, Mississippi

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2015

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Project Learning Tree (PLT) is an international environmental education (EE) program designed for educators working with children and youth. In Mississippi, roughly 700 educators are trained yearly in using PLT curricula; however, how and if teachers use knowledge gained from these workshops remains unknown. This study addresses the environmental awareness and use of PLT curricula in traditional classroom of primary and secondary teachers in Mississippi. Using PLT participant survey data, individuals trained during the years 2009-2013 were surveyed using Qualtrics Survey Software. Mississippi teachers appear to have ecocentric worldviews, above average environmental knowledge, and have incorporated PLT lessons into their classroom curricula. Teachers' subject areas appear not to affect their usage of PLT, while motivation for incorporating and attending PLT workshops appears to have minor effects. Results of this study can be used to increase the efficiency of PLT workshops, as well as mitigate barriers to incorporating PLT into classrooms.

DEDICATION

I would like to dedicate this work to my parents and my fiancé. It has been said that one of the most special things you can do for your loved ones is to help them to fall in love with nature. Thomas and Karen, thank you for instilling in me the value of education, the work ethic that has made me so successful, and the love of nature and all living things. Kenneth, there are no words to describe how much I appreciate your support and love. Thank you for your patience, understanding, and most of all thank you for your reassurance throughout it all. I cannot wait to start the next chapter of our lives together. You are my best friend and I love you.

ACKNOWLEDGEMENTS

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are often great. Thank you for taking on one of the hardest and most important jobs that exists. You are all truly heroes.

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CHAPTER I

INTRODUCTION

Statement of Problem

Environmental education (EE) programs have not yet found an acknowledged

niche in the traditional school curriculum in Mississippi. Many schools do not

incorporate EE programs and, when used, only supplement existing curricula. EE

programs can take many forms, allowing them to be used in almost all traditional school

settings. Additionally, EE programs are highly interdisciplinary and can be a useful tool

for connecting core subject areas in child and youth education.

Providing adequate conservation and EE programs are a critical component of a

proactive approach to mitigating current environmental damage and preventing farther

environmental damage and degradation. For any change to occur, there needs to be an

awareness and understanding of the issues, and education can be the tool that assists in

developing this process. EE programs serve as a powerful tool and are greatly underused

within formal and traditional education systems. It is important teachers are introduced

to the benefits of EE program methods for their students and are properly trained in

presenting environmentally-based education programs.

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Background of Study

As a society, there are many instances where we have exploited and misused our environment. We currently live in a world of rapid population growth, development, and unsustainable use of natural resources. Issues concerning pollution, extinction, deforestation, energy, climate change, and general environmental degradation have progressed as the society demands more from the natural environment. While wise use of natural resources is needed for economic growth and development, gross misuse could result in major environmental and social impacts (Cronin, 2009).

The United States continues to become an increasingly urbanized nation, with 80.7% of the population now living in an urban setting (United States Census Bureau, 2010). Concurrently, the ways in which citizens view natural resources are changing. Before vast urbanization, the average American had daily direct interactions with natural resources and understood the health of the society was depended on proper management of these resources (Stapp and Havlick, 1969). "Traditional" outdoor activities, such as hunting and fishing, are in decline and non-consumptive activities such as wildlife viewing are on the rise (Cordell and Hoyle, 2012). These trends can be representative of changes in attitudes, knowledge, and behaviors of the American public towards wildlife and natural resources. Increasingly many aspects of the American lifestyle suggest that we are independent of nature and the natural resources (Kupchella and Hyland, 1977).

With these changing trends, it is increasingly important to provide sound environmental education to the public. Awareness of environmental issues and concerns previously were disseminated through humanity's connection to the environment but as society continues to separate itself from the natural world, it is unknown if information

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transmission will continue in this way. Alternative sources to providing information will become increasingly important as these trends continue.

In addition to the changing views of adults, children are not exposed to many aspects of natural resources (Louv, 2005). Many of their attitudes and beliefs are not based on sound environmental knowledge but rather on what they have learned from others around them and through the media. Additionally, many parents lack the qualifications or interest to teach their children about the environment (Kupchella and Hyland, 1977).

Many possible reasons exist for the recent movement of children and youth to indoor activity. As the United States became increasingly urbanized, many green spaces were rezoned and developed for other land uses limiting access to natural areas for some populations (Stenger-Ramsey and Curl, 2010). Additionally, many parents and caretakers fear what may happen to their children if allowed to engage in outdoor play. Child abductions, animal attacks, bites or stings, diseases, and the general feeling of lack of control of the natural setting lead to fears in many parents and ultimately reduce the use of nature as a place of growth and development for children and youth. In what Louv (2005) refers to as the "criminalization of natural play," some cities and towns have enacted laws and regulations which further limit children's abilities to explore natural environments. Throughout the United States, cities and towns now have laws intended to protect children, such as curfews and increased regulations on the building of tree houses and forts, but these prohibitions have unintended consequence of limiting natural play (Louv, 2005). Without having this connection and awareness of the environment, children may lack the motivation needed to protect the natural resources.

Education is considered a major contributing factor to long-term solutions for mitigating environmental issues (Gihar, 2011). Teachers have the responsibility to educate and provide information to large numbers of students. An opportunity thus presents itself as an estimated 55.6 million children (pre-kindergarten through 12th grade; public and private) attended school in the 2014-2015 school year (National Center for Education Statistics, 2010). Teachers represent an important opportunity to provide environmental programming to children and youth. Fifty percent of students will only receive exposure to environment concepts from their classroom experience (Lane and Fritz, 2000). Teachers need to be aware of the critical role they play in the future of environmental issues and its ties to the next generation.

The United States is developing EE programs faster than the rest of the world (Council, 2005). There are programs being implemented within the school system currently but without the broader understanding of the effectiveness of these programs, they may fail in achieving their purpose. An estimated 15% or less of traditional science teachers have participated in EE training programs (Stern et al., 2008) with only 10% of all United States K-12 teachers participating in formal EE teaching methods and training course (Ernst, 2009). Furthermore, preservice teacher (a student who has not yet completed training to be a licensed teacher) education training programs related to environmental education are often limited and under developed (Disinger and Howe, 1990). Although there is a growing body of literature, few studies have examined the relationship between teachers and the natural resources field (McKeown-Ice, 2000).

Natural resource professionals are often the individuals tasked with conducting EE professional development workshops. These professionals often assume that once

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presented with the information, teachers will develop a firm grasp of the subject matter and begin implanting this material in their classrooms; however, the true fate of this training is unknown (McKeown-Ice, 2000).

Project Learning Tree (PLT) is an interdisciplinary, international EE program of the American Forest Foundation (AFF) designed to provide professional development opportunities to traditional teachers working in both primary and secondary schools. In addition to providing professional training to teachers, PLT's mission is to increase student understanding, awareness, and appreciation of the environment; stimulate critical, higher level, and creative thinking; develop an appreciation of diverse viewpoints; kindle abilities of students to make informed decisions; and develop students into citizens that choose environmentally responsible actions (American Forest Foundation, 2012). The PLT curriculum provides trained teachers with needed resources to increase environmental literacy and promote environmental stewardship among their students.

Significance of Study

Findings of this study will be used to improve the effectiveness of Mississippi PLT workshops by identifying motivational factors and barriers to teacher participation in PLT training workshops and classroom implementation. Understanding teacher participation is a critical component to mitigating barriers and promoting increased PLT curriculum use within Mississippi schools. In this study, motivations are representative of the reason or reasons that an individual is selecting to participate in PLT workshops, as well as the reason or reasons they choose to incorporate PLT materials into their classrooms.

Scope and Limitations of Study

This study focused on Mississippi teachers who had attended a PLT continuing education workshop. While the survey population included all participants in PLT workshops from 2009-2013, including some non-teachers, it is the goal of this research to identify usage of the PLT curriculum by Mississippi teachers. It should be noted that not all PLT workshops provided the same experience to participants because there are currently 450 trained PLT facilitators in Mississippi. From 2009-2013, approximately 60 facilitators were actively presenting PLT workshops with the majority being presented by 30 individuals. This study did not evaluate the effects of facilitators on workshop outcomes because these effects are difficult to quantify. The study population was limited to a specific group of individuals; therefore, study results cannot be extended outside population parameters and are only applicable to this sub-population of Mississippi teachers. This study also relied on self-reported behaviors and, therefore, may have over-estimated usage of PLT lessons within teacher classrooms.

Objectives

This study was initiated to assess the environmental awareness and use of PLT curricula in traditional classrooms of preservice, primary, and secondary teachers in Mississippi. Mississippi teachers who participated in PLT workshops, a program of the AFF, were surveyed. It was not the goal of this study to discover if PLT workshops changed awareness but to assess the level of environmental awareness and determine what teachers do with the information provided during EE workshops.

Research Questions and Hypotheses

To address environmental awareness, use of PLT curricula in traditional classrooms of teachers (including preservice, primary, and secondary) in Mississippi, and what factors limit the use of PLT, I chose three overarching research areas and explored the following questions:

1. What is the environmental awareness of teachers who have completed a Project Learning Tree workshop in Mississippi?

2. Do teachers implement the Project Learning Tree curriculum acquired during a Project Learning Tree workshop?

3. What challenges limit implementation of Project Learning Tree curriculum and what incentives can be provided to mitigate these challenges?

Question One Hypothesis

I sought to measure the level of environmental awareness among teachers who have completed a PLT Workshop. I did not attempt to compare these individuals with teachers who remain untrained in EE, nor have I compared teachers' pre- and post-PLT workshop environmental awareness scores. The goal was to acquire a baseline measure for PLT-trained Mississippi teachers.

In this study, environmental awareness was measured using the New Ecological Paradigm Scale (NEP), widely accepted as a measure of environmental awareness and concern (Dunlap and Van Liere, 2008). The NEP Scale is described in detail in this document's literature review. I also examined factors that may affect awareness and compared environmental awareness to motivation for attendance at PLT workshops.

a) H_{1A}: Mississippi teachers who have completed PLT workshops will have NEP scores that reflect pro-environmental views, as defined by NEP scores of 45 or higher.

b) H_{1B}: Individual's motivation to attend PLT workshops is not affected by a teacher's NEP score.

Question Two Hypotheses

I sought to measure teacher's retention of PLT workshop provided environmental knowledge, as well as implementation of PLT lessons. Not all PLT workshops provided the same experience to participants; however, three PLT curriculum lessons were identified as being frequently used during workshops. "The Earth as an Apple," "Tree Factory," and "400-Acre Wood" were used to design a short, nine-question, exam to represent the natural science information provided during a majority of PLT workshops.

Additionally, I addressed the amount and diversity of PLT lessons implemented in the classroom, including addressing which broad PLT topic areas are most commonly taught. I examined factors that may influence teacher usage of PLT curriculum materials, including teacher specialty areas and motivations to incorporate environmental topics.

a) H_{2A}: Teachers will score 50% (five correct answers) or higher on the knowledge assessment.

b) H_{2B}: Teachers will have incorporated one or more PLT lessons into classroom teaching.

c) H_{2C}: Teachers' subject area will not affect the frequency of use of PLT lessons incorporated into classroom instruction.

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d) H_{2D}: Teachers' motivation for incorporation will not affect the frequency of use of PLT lessons in classroom instruction.

Question Three

The aim of this query is not to test which motivations or limitation are strongest, but rather to identify existing motivations and limitations; therefore, hypotheses are unnecessary. I attempted to gain an understanding of what motivates teachers to attend PLT workshops and use the curriculum in their classrooms. Teachers were asked to identify their personal motivations for attending PLT workshops and implementing PLT lessons and materials. I asked respondents to identify methods to encourage other teachers to attended workshops and include environmentally-based lessons in curricula. Additionally, I explored what factors may limit the use of PLT within traditional classrooms.

CHAPTER II

LITERATURE REVIEW

Environmental Education

According to the United State Environmental Protection Agency (EPA), EE is a "process that allows individuals to explore environmental issues, engage in problem-solving, and take action to improve the environment" (2014). EE can also mean the study of the natural environment and ways in which humans interact with that environment (Merritt, 2008). EE combines concepts of awareness, knowledge, attitudes, skills, and participation to create programming which seeks to teach individuals critical thinking, problem-solving, and decision-making skills (United States EPA, 2014). Environmental education is interdisciplinary and often learner-centered, taking advantage of individuals' natural curiosities.

History of Environmental Education

Introduction

What is currently known as EE has had a long history in the United States. However, many scholars and professionals disagree on the exact history of the concept (Carter and Simmons, 2010). Beginning in the late 19th and early 20th centuries, the first origins of what would become EE were being created. In the 1920s and 1930s, education reforms and historical events largely pushed environmental concerns away from the

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public eye. The mid to late 1940s and 1950s saw an awaking of conservation efforts. The 1960s and 1970s were a time of changing environmental attitudes as visibility of environmental deterioration came to the spotlight. It was at this time The United Nations Educational, Scientific and Cultural Organization (UNESCO) pushed for the establishment of a firm definition of EE (Ferguson, 2011). Out of this movement programs, such as PLT were created as a way to educate the public on environmental topics. Through the 1980s and 1990s, the concept of EE was advanced and refined due to a growth of research in this field.

Nature-study

Nature-study is considered the first true science curriculum to focus on ecosystems in United States schools (McComas, 2008). Developed in the 19th century by Cornell University biologist, Liberty Hyde Bailey and his protégé Anna Botsford Comstock, nature-study was created in response to address the agricultural depression in New York (Walker, 2012). Evolving from its origins (a study of all things natural) it morphed into a method of teaching science by applying formal educational pedagogies to the study of the natural world. Nature-study established instructional approaches to the study of the natural world. These methods included the importance of studying objects in context through first-hand experience, encouraging student questioning and inquiry-based instruction (McComas, 2008). Nature-study remained widespread in the United States until educational reforms in the 1920s ultimately limited its use in traditional schools (Walker, 2012).

Outdoor Education

EE programs remained greatly underutilized during much of the 1920s through 1940s, with the exception of a few school camping programs (Hammerman, 1987). During this time, the United States faced many challenging historical events which overshadowed environmental issues. The 1920s marked an industrial era. Following the end of World War I, the housing market boomed and production of automobiles reached levels not seen previously. Prohibition and the end of the women's suffrage movement also marked dramatic changes in this decade. For the first time in U.S. history, more Americans lived in cities and towns than in rural areas. The 1920s ended with the stock market collapse that would lead to the Great Depression of the 1930s. The 1930s were a stark contrast to the prosperity in the 1920s; the 1930s were a time of economic misery. Poor land management and drought led to the Dust Bowl and agriculture depression. World War II, the start of the Cold War, and the age of nuclear weapons marked the 1940s.

In the post-World War II era, concerns for the environment led to the development and later an increase in the use of school camping programs as a means to teach conservation education (Santos, 1987). A surge in publications and guides referred to this area of study as outdoor education. Educators believed that the goals of school camping were parallel to those in the traditional classroom (Hammerman, 1974). Outdoor education was thus viewed as an extension of the traditional school curriculum.

Environmental Awakening

The term "environmental education" was born during the late 1960s during the environmental awakening era in the United States. The country saw a widespread social

shift toward ecocentric worldviews and humanity's relation to the environment. This shift from outdoor education to environmental and conservation education occurred largely as a result of the publishing of *A Sand County Almanac* by Aldo Leopold in 1949 (Leopold, 1949). Many consider Leopold the "father" of wildlife and conservation management, and his book remains a fundamental work in the modern American environmental movement (Carter and Simmons, 2010). Leopold's contributions to modern environmentalism were so vast, largely impart to his belief in social good by acceptances of both ecological and social stability (Cannavò, 2012). Leopold's balance of human needs, land use, and conservation provided the background for many land use practices used today (Berkes et al., 2012; Van Horn, 2011; Warren and Kieffer, 2010).

Over a decade later, two additional works were published that highlighted environmental problems in the United States. Rachel Carson's *Silent Spring* exposed Americans to the unintended consequences of chemical pest controls (Carson, 1962). Steward Udall's *The Quiet Crisis* highlighted a range of existing and looming environmental threats (Udall, 1963). These works together created the momentum that spurred grassroots organizations to the White House, leading to the creation of an unprecedented number of environmental actions and legislation (Carter and Simmons, 2010). On April 22, 1970 an estimated 20 million people joined in an environmental teach-in throughout the nation, to protest environmental ignorance, an event that would become known as Earth Day (Rome, 2003).

Throughout the remainder of the 1960s, and into the 1970s, environmentally focused laws were enacted that reflected the nation's concern for the environment, many centered on conservation and restoration. The Clean Air Act of 1963 created air-quality

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guidelines and identified major sources of pollutants, including vehicle exhaust and sulfur found in fuels. This Act would later be amended three times (The Motor Vehicle Air Pollution Control Act of 1965, Clean Air Act Amendment of 1966, and The Air Quality Act of 1967) (Pearson et al., 1970). The Wilderness Act of 1964 led to the establishment the National Wilderness Preservation System (NWPS), which provided management and protection to federally owned land for the benefit of the whole society (The Wilderness Society, 2004). A year later, the passage of The Water Quality Act of 1965 led to the creation of the Federal Water Pollution Control Administration (FWPCA) and mandated water quality standards (Pearson et al., 1970). This Act included the Water Quality Improvement Act of 1970 amendment, which extended the Act to include funding for detection and cleanup of oil spills. Amended again in 1972 and 1977, the Clean Water Act was created to establish "best practices" of limiting pollution found in U.S. surface water and served as the principal legislation governing water pollution.

The National Environmental Policy Act of 1969 (NEPA) served as one of the first comprehensive national laws for the protection of the environment. NEPA requires that agencies must evaluate the potential impacts of developments on the environment by creating Environmental Assessments (EAs) and Environmental Impact Statements (EISs) (Brill, 2014). Assessments must include the likelihood of possible impacts and alternative protocols. The Endangered Species Act of 1973 extended federal protection to wildlife species meeting endangerment criteria of threatened or endangered.

In 1970, The Environmental Education Act was passed. This legislation called for the creation of an Office of Environmental Education under the Office of Education (Hammerman, 1974). This acted represents one of the most critical turning points in the

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widespread acceptance of EE and was the first legislative action that directly promoted EE.

Awareness, laws, organizations, and regulations of the conservation era set the stage for the development of what today we call EE. Governmental and non-governmental organizations such as EPA, Natural Resources Defense Council (NRDC), National Oceanographic and Atmospheric Administration (NOAA), and World Wildlife Fund (WWF), were established during the environmental awakening and continue in existence today.

Nature Deficit Disorder

In today's society, there are many instances where we have exploited and misused our environment. We currently live in a world of rapid population growth, development, and unsustainable use of natural resources. Issues of pollution, extinction, deforestation, energy, climate change, and general degradation have progressed as society demands more from the natural environment. While the wise use of natural resources is needed for both economic growth and development, gross misuse could result in major environmental and social impacts (Cronin, 2009).

In the United States, 80.7% of the population now lives in an urban setting (United States Census Bureau, 2010). Before vast urbanization, the average American had daily direct interaction with the natural resources and understood the health of the society depended on the proper management of these resources (Stapp and Havlick, 1969). Today the "traditional" outdoor activities, such as hunting and fishing, are in decline and other less consumptive outdoor activities such as wildlife viewing are on the rise (Cordell and Hoyle, 2012). These trends are representative of changes in attitudes,

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knowledge, and behaviors of the American public towards wildlife and natural resources. Increasingly many aspects of the American lifestyle suggest that we are independent of nature and the natural resources (Kupchella and Hyland, 1977). With these changing trends, it is increasingly important to provide sound environmental education to the public.

In addition to the changing views of adults, children are not exposed to many aspects of the natural resources. Many of their attitudes and beliefs are not based on sound environmental knowledge but rather on what they have learned from others around them and through the media. Many parents lack the qualifications or the interest to teach their children about the environment (Kupchella and Hyland, 1977).

In what Louv (2005) refers to as the "criminalization of natural play," some cities and towns have enacted laws and regulations which further limit children's abilities to explore natural environments. Throughout the United States, cities and towns now have laws intended to protect children, such as curfews and increased regulations on the building of tree houses and forts, but these prohibitions have unintended consequences of limiting natural play (Louv, 2005). Children lack the connection to natural resources required to create the motivation to protect them.

Louv (2005) also described the loss of connection to the natural world as "nature deficit disorder." He believed recent trends in child engagement in natural play and outdoor environments were a major contributing factor to behavioral and physical problems faced by children and youth including numbing of senses, problems with focusing, and physical and emotional illnesses (Louv,2005; Shaughnessy, 2005).

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Many possible reasons exist for the movement of children and youth to indoors recreation. As the United States became increasingly urbanized, green spaces were rezoned and developed for other land uses, limiting access to natural areas (Stenger-Ramsey and Curl, 2010). Additionally, many parents and caretakers feared what may happen to children if allowed to engage in outdoor play (Louv, 2005). Child abductions, animal attacks, bites or stings, diseases, and the general feeling of loss of control could lead to fears in adults and ultimately reduce the use of nature as a place of growth and development for children and youth.

No Child Left Inside

Benefits of time spent in natural settings is being supported increasingly by a growing body of research (Cosco et al., 2014; Dyment and Coleman, 2012; Edelson, 2007; Larson et al., 2010; Taylor et al., 2001), resulting in a number of initiatives that have been initiated (Koch, 2006). One of the most notable was the passage of the No Child Left Inside Act of 2008 (Committee on Education and Labor, 2008). This bill amended the Elementary and Secondary Act of 1965, with the intended purpose to improve environmental literacy as a means of better-preparing students for the future. The U.S. Congress recognized children and youth were increasingly disconnecting from that natural world, and that natural play and learning are important in all major development areas. Perhaps most importantly, this bill identified EE programs incorporated in formal education systems provide invaluable opportunities for children and youth to engage in outdoor learning.

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History of Project Learning Tree

PLT was founded in 1976 through the partnership between the American Forest Institute and Western Regional Environmental Education Council (American Forest Foundation, 2014). This collaboration wished to develop an "unbiased and educationally sound" program for students along with their teachers (American Forest Foundation, 2014). PLT aimed to provide EE, professional development, and curricula that highlight the importance of forests by using "forests as a window on the world." During the 1980s, PLT continued to grow, expanding into Canada and 49 American states (American Forest Foundation, 2014).

After workshops, revision sessions, and pilot testing, PLT released a revised curriculum in 1993 with a reprinting every subsequent year (American Forest Foundation, 2014). Following the new curriculum, PLT released GreenWorks! (a service-learning and community improvement grant initiative), created stand-alone modules on specific topics aimed at high school aged youth, and established programs in all 50 states and the District of Columbia (American Forest Foundation, 2014). PLT also introduced "Environmental Experiences for Early Childhood" to provide environmental curriculum aimed at children three to six years in age.

PLT continues to revise and update its curriculum while adding modules and expanding programs and professional development. In addition to the program's success in the United States, PLT materials and programs exist in 10 other countries, including Japan, Mexico, Sweden, Slovakia, China, Finland, Brazil, Jordan, and the Philippines (American Forest Foundation, 2014). PLT materials are only available through attendance in a PLT sponsored workshop. Most commonly, these workshops are

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advertised and offered to preservice teachers, in-service teachers, and other educators (Easton and Monroe, 2002). Today in the United States, roughly 20,000-30,000 educators attend PLT workshops every year; in Mississippi, roughly 700 individuals are trained.

In addition to providing professional training to teachers, PLT's mission is to; increase students understanding, awareness, and appreciation of the environment; stimulate critical, higher level, and creative thinking; develop an appreciation of diverse viewpoints; kindle abilities of students to make informed decisions; and develop students into citizens that choose environmental responsible actions (American Forest Foundation, 2012). The PLT curriculum provides trained teachers with resources to increase environmental literacy and promote environmental stewardship among their students. Independent evaluators of the PLT program have shown gains in students' knowledge of environmental topics, increased reasoning skills, and improvements in overall academic achievement (American Forest Foundation, 2014).

PLT represents an EE curriculum that is tailored for use in the traditional classroom setting. PLT curriculum materials and lessons plans have been correlated to multiple national and state-based standards. Alignment documents for the formal education system include, Common Core State Standards (CCSS), National Science Standards (NSS), National Social Studies Standards (NSSS), and state-based correlations for all 50 states. Most recently, documents were created to provide linkages to Science, Technology, Engineering, and Mathematics (STEM) education, as well as, the Next Generation Science Standards. The PLT curriculum for early childhood has also been

aligned to the Head Start Child Outcomes Framework and the National Association for the Education of Young Children (NAEYC) Framework.

Although use in traditional schools is the primary focus of the PLT curriculum, this material works successfully in informal and nonformal education as well. PLT has created documents to connect their materials with nonformal programs such as the Boy Scouts of America and the Girl Scouts of the USA. The North American Association for Environmental Education (NAAEE) created the National Project of Excellence in Environmental Education program, which created a set of standards for excellences in teaching EE (American Forest Foundation, 2012). The PLT program served a role in both the development and the implementation of the NAAEE standards, and all PLT curriculum materials and lesson adhere to these guidelines.

Project Learning Tree in Mississippi

The Mississippi Forestry Commission, the Mississippi Forestry Association, and the Sustainable Forestry Initiative sponsor the Mississippi PLT program. Currently, there are 450 trained PLT facilitators in the state, with 60 actively presenting workshops (Anderson, 2015). Each year roughly 700 individuals attend PLT training workshops. Mississippi PLT trains a wild variety of individuals in the usage of PLT curriculum and materials. In an average year, roughly 50% are in-service teachers, 40% preservice teachers, and the remaining 10% consist of nonformal and informal educators, natural resource professionals, extension agents, and individuals interested in learning the PLT program.

PLT workshops train educators in how to best use the PLT curriculum in their local settings and communities, and how to provide an overview of EE concepts and

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practice. The majority of Mississippi PLT workshops are in-person, standalone educator workshops. This mode of delivery provides educators with a network of local professionals willing to provide support and assistance to newly trained teachers (American Forest Foundation, 2014). These workshops occur as one-day, 6-hour format or a session incorporated in a weeklong, local program known as Teachers Conservation Workshop (TCW). PLT workshops are currently available for a registration fee of $15. Additional fees may apply if the individual is looking to obtain credit for participation (i.e., continuing education credits or college course credit). Mississippi PLT often reduces this cost by pursuing sponsorships and grant opportunities.

The Mississippi Forestry Association offers two TCW during the summer months to provide hands-on environmental-based education training to Mississippi teachers. This weeklong program covers a variety of environmental topics including timber management, water quality, soils, and tree identification. Additionally, one day is devoted to PLT. The PLT workshop is conducted in the same manner as a standalone workshop.

Environmental Awareness

In its simplest form, environmental awareness is a consciousness concerning the environment, the understanding that one's daily activities may affect natural resources on a local, regional, and global scale. Awareness incorporates many other concepts, including knowledge, attitudes, and behaviors (Nagra, 2010). Environmental awareness is an interdisciplinary measure and must be ongoing to have any impact on positive environmental outcomes (Xue et al., 2006). To assess environmental awareness, it is important to understand the actual threat to the environment is not the significant

measure; what is important is the social relationship to the environment (Smrekar, 2011). An individual with high environmental awareness will express concern and understanding of general environmental issues and uses, as well as the value placed on natural resources for both current and future generations (Lukman et al., 2013).

Having a measure of an individual's awareness is a key component for both the implementation of environmental programming and creation of improved environmental programs. Understanding awareness allows for the creation and improvement of EE programs that better targets the needs of individuals. For a teacher, understanding their own level of awareness along with their students' level of awareness can affect how they present an EE program to their classroom, and consequently, how their students receive this information (Darling-Hammond, 2000).

New Ecological Paradigm (NEP)

Riley Dunlap and colleagues designed the New Ecological Paradigm (NEP) Scale in Washington state in 1976, to serve as a measure of pro-environmental worldviews (Dunlap and Van Liere, 1978; Dunlap et al., 2000). The original NEP, was later published in 1978, consisted of 12 statements and was highly criticized for poor correlation between the scale and actual behavior, lack of internal consistency, and the use of "dated" language (Anderson, 2012). To addresses these criticisms the revised NEP was developed. The revised NEP Scale has been greatly used in assessment of environmental concern among groups of individuals (Anderson, 2012).

The revised NEP Scale consists of 15 statements ranked on a 5-point Likert scale. Respondents are asked to indicate their strength of agreement or disagreement as related to each statement. Responses to the statements are transformed into numerical data and

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used to construct a measure of environmental concern. Individuals with ecocentric worldviews will score higher on the NEP Scale while those with anthropocentric worldviews will score lower.

Although there are still some who believe the revised NEP is limited in its ability to measure the "complexity of humans" understanding of nature (Lalonde and Jackson, 2002), it is one of the most accepted and widely used measures of environmental awareness and is seen as a reliable and valid instrument for assessment of environmental worldviews (Anderson, 2012). The revised NEP Scale provides researchers with a validated and reliable measure of an individual's worldview that can then be used to pursue trends and establish relationships among multiple other factors (Anderson, 2012).

The revised NEP Scale is widely used to assess relationships between worldviews and attitudes towards policy, recreation participation patterns, pro-environmental actions and behaviors, among many other topics (Anderson, 2012). The revised NEP Scale has also been used in EE as a measure assessing pre- and post- incorporation of programs, as well as to provide a baseline measure of a population's worldviews. The revised NEP Scale can serve as a measure of society's views and movement towards wise use and sustainability of the natural resources. Additionally, with its extensive use the revised NEP Scale allows researchers to make comparisons across multiple study areas and study types.

Environmental Education in Traditional Curricula

Despite EE's long history in the United States, it has struggled to gain and maintain a place in the formal education system. In the 1990s, efforts were focused on restructuring science education programs within schools (Fortner and Boyd, 1995). The

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current education system teaches subjects in isolation. This discipline-order approach to teaching science often lacks relevance, poorly prepares students for real-world applications of science, and makes it difficult for interdisciplinary areas of study like EE to be established in a formal role in the education system.

The interdisciplinary nature of EE gives it the ability to the make fundamental sciences meaningful and relevant to students (Edelson, 2007). The inclusion of EE programs in the traditional curriculum could allow students to make connections between science, social sciences, mathematics and their everyday lives (Edelson, 2007). EE is a truly interdisciplinary and contemporary science. Programs, such as PLT, are working to make the incorporation of EE easier for teachers by creating curriculum guides that fit with the requirements of school curricula. Understanding if these teaching tools are used and helpful ensures that students receive the best education.

CHAPTER III

METHODOLOGY

Introduction

Surveys are one of the most commonly used forms of data collection and widely

utilized throughout the scientific community, especially for studies dealing with human

dimensions aspects (Singleton and Straits, 2010). I selected a web-based survey method

for this study because of the faster response, data protection, ease of data export, ease of

data storage, convenience to participants, and reductions in both monetary and time costs

(Mertler, 2003). Digital surveying methods can provide the researcher with advantaged

data protections, such as encryption, that allow for the safe, long-term storage of research

data.

Research Questions and Objectives

To address environmental awareness, use of PLT curricula in traditional

classrooms of preservice, primary, and secondary teachers in Mississippi, and what

factors may limit the use of PLT, I chose the three overarching research questions and

hypotheses.

1. What is the environmental awareness of teachers who have completed
   a Project Learning Tree workshop in Mississippi?

a) H_{1A}: Mississippi teachers who have completed PLT workshops will have NEP scores that reflect pro-environmental views, as defined by NEP scores of 45 or higher.

b) H_{1B}: Individual's motivation to attend PLT workshops is not affected by a teacher's NEP score.

2. Do teachers implement the Project Learning Tree curriculum acquired during a Project Learning Tree workshop?

a) H_{2A}: Teachers will score 50% (five correct answers) or higher on the knowledge assessment.

b) H_{2B}: Teachers will have incorporated one or more PLT lessons into classroom teaching.

c) H_{2C}: Teachers' subject area will not affect the frequency of use of PLT lessons incorporated into classroom instruction.

d) H_{2D}: Teachers' motivation for incorporation will not affect the frequency of use of PLT lessons in classroom instruction.

3. What challenges limit implementation of Project Learning Tree curriculum and what incentives can be provided to mitigate these challenges?

Research Setting and Participants

This survey was distributed to all individuals who have completed Mississippi PLT workshops during 2009 - 2013. The majority of individuals participating in these workshops are preservice (a student who has not yet completed training to be a licensed teacher), primary, or secondary teachers. In addition to teachers, Mississippi PLT has

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also trained non-formal and informal educators (educators working outside the traditional school system), parents, Extension agents, and individuals who are interested in learning environmentally-based curricula. In an average year, roughly, 50% are in-service teachers, 40% preservice teachers, and the remaining 10% consists of other individuals interested in learning the PLT program.

Names and contact information for individuals attending PLT workshops from 2009-2013 were collected from Mr. Harold Anderson, Mississippi Project Learning Tree Coordinator. PLT participant surveys are completed at the conclusion of every Mississippi PLT workshop, and names and addresses were secured from these documents. This brief survey provided feedback, facilitator information, location of the workshop, and contact information of the individuals attending a workshop. For this study, e-mail addresses provided by participants on the concluding surveys (PLT participant surveys) were used for electronic contact. All of the above data secured from the surveys were converted from the hard copies in to electronic files by this researcher.

Questionnaire Design

The survey instrument used of both open- and closed-ended questions, including attitudinal, knowledge, and behavioral measures allowing the instrument to address both environmental awareness and implementation of PLT workshop curriculum (Schaeffer and Presser, 2003). The survey instrument was designed to address four major concepts: environmental awareness, PLT workshop knowledge, classroom implementation of PLT curriculum, and barriers and motivations to implementation of PLT in classrooms. A fifth section contained requests for socio-demographic information of participants.

Awareness Measure

Survey questions addressed the individual respondents environmental worldview (Lukman et al., 2013) through use of the revised NEP Scale (Dunlap, 2008; Dunlap and Van Liere, 1978, 2008; Dunlap et al., 2000). The NEP Scale will serve as a proxy measure of an individual environmental awareness in this study. The 15 statement revised NEP Scale was used to generate a total score of environmental awareness (Table 3.1). Scale items used a Likert-type response scale ("strongly disagree," "disagree," "neither agree nor disagree," "agree," "strongly agree").

Table 3.1   Revised New Ecological Paradigm (NEP) Scale statements

NEP Statement
1) We are approaching the limit of the number of people the Earth can support.
2) Humans have the right to modify the natural environment to suit their needs.
3) When humans interfere with nature, it often produces disastrous consequences.
4) Human ingenuity will insure that we do not make the Earth unlivable.
5) Humans are severely abusing the Earth.
6) The Earth has plenty of natural resources if we just learn how to develop them.
7) Plants and animals have as much right as humans to exist.
8) The balance of nature is strong enough to cope with the impacts of modern industrial nations.
9) Despite our special abilities, humans are still subject to the laws of nature.
10) The so-called "ecological crisis" facing humankind has been greatly exaggerated.
11) The Earth is like a spaceship with very limited space and resources.
12) Humans were meant to rule over the rest of nature.
13) The balance of nature is very delicate and easily upset.
14) Humans will eventually learn enough about how nature works to be able to control it.
15) If things continue on their present course, we will soon experience a major environmental catastrophe.

Revised New Ecological Paradigm (NEP) Scale (Dunlap, 2008) statements as seen in a Mississippi Project Learning Tree (PLT) participant survey conducted on traditional school teachers attending PLT from 2009-2013.

Respondents were asked to identify how they felt about the statement made. Each response was assigned a point value of one through five such that five represented an ecocentric worldview; one was representative of an anthropocentric worldview. An

overall total score (ranging from 15-75) was calculated and then used to assign an environmental awareness value to the participant. Higher scores represented more ecocentric worldviews and lower scores indicated viewpoints that are more anthropocentric.

Knowledge Post Workshop

A short, nine question, closed-ended natural science exam was developed to assess basic information provided during a majority of PLT workshops. It should be noted that not all PLT workshops provided the same experience to participants. Through interactions with PLT facilitators who were most active during 2009-2013, I identified three lessons that were heavily used: "The Earth as an Apple," "Tree Factory," and "400-Acre Wood." Currently, there are 450 trained PLT facilitators in Mississippi, with 60 actively presenting workshops from 2009-2013 (Anderson, 2015). Thirty facilitators presented the majority of the workshops during from 2009-2013.One individual facilitator was identified as presenting 85% of the total PLT workshops held during this time.

Additionally, while this knowledge is presented at the majority of PLT workshops, it is possible that the PLT workshop was not the sole source whereby participants were gaining this knowledge. Survey participates may have general environmental knowledge not gained through PLT. Questions asked in this section seek to answer individuals' natural science knowledge post-PLT workshop.

Implementation of PLT Curriculum

Participants were asked about the use of PLT and other EE materials in their classrooms using closed-ended questions. This data provided insight into whether they had incorporated any PLT lessons into their classroom curriculum and the degree of incorporation. Respondents were asked to address how often they teach environmental and conservation topics in their classrooms, including those that are not focused on PLT. Finally, if they are not teaching PLT lessons, respondents were asked whether they used EE curricula from other educator-focused environmental workshops. These data were collected open-ended entry of all environmental-based workshops they had attended in addition to PLT.

Barriers and Motivations

Participants were asked to report on their motivations for attending PLT workshops and for incorporating PLT lessons into their classrooms using closed-ended questions. All questions in this section included an "other" checkbox in which additional information was solicited using an open-ended explanation. Additionally, participants were asked to identify barriers to incorporating PLT. Finally, information on possible incentives to encourage more participation in PLT workshops and additional incorporation was requested. Motivations available for selection in this study, were derived from a survey conducted on science educators that had participated in New York PLT workshops (Velardi, 2014).

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Pilot Test

Pilot Test One

Individuals who participated in PLT workshops pre-2009 were surveyed (N=790). Microsoft Excel® was used to create a random number list of 100 numbers that ranged in value from 1-790. Randomly generated numbers were matched with participant survey forms. This created a list of e-mails that included repeated e-mail addresses and participant surveys without contact information. From this list, repeated e-mail addresses and those lacking contact information were removed. The first 55 e-mail addresses that remained were selected for contact.

Initial, follow-up, and thank you contacts for those who completed at least part of the survey were made. The initial contact included 10 individuals that "hard" bounced and two failed e-mails. A "hard" bounce was identified as a permanent reason for the non-deliverability of an e-mail (e.g., a deceased individual, deleted account). The number of potential respondents was reduced to 43. Additional follow-up contact was made 14 days after the initial mailing, a thank you mailing was scheduled to be sent 28 days after the initial contact; however it was not sent due to the lack of returned surveys. I received zero completed or partial surveys as result of this pilot survey. Two individuals opened the survey link and began the survey; however, these individuals did not submit any responses to survey questions.

Pilot Test Two

Due to an inadequate response rate of the first pilot test, an additional pilot test including only participants from 2014 was conducted. The same methods were followed

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for creating a random number list and selecting survey participants to survey. Again, the first 55 e-mail addresses were selected and contacted.

An initial, follow-up, and thank you contacts for those who completed at least part of the survey were made. The initial contact included seven individuals that "hard" bounced and zero failed e-mails reducing the sample to 48 individuals. I received three completed surveys in pilot test two resulting in a 6.25% response rate.

None of these three individuals identified any issues with the surveys construction or wording. All reported finishing the survey within 15 minutes of beginning. However, there was a question, which all three answered in a way different from its intended response. This questions aim was to acquire the subject area of responding teachers. However, respondents in pilot test two listed answers related to teaching level or grade range (e.g., "Elementary Education"). This question (Question 51 on the final survey) was reworded from "What is your primary teaching certification/specialty area?" to "What is your primary teaching certification subject or specialty area?"

Since there were few returns and few comments beyond this one, I also relied on the expertise of my graduate committee and the literature to assess the survey for its credibility and made further minor changes as needed. Additionally, statements of explanation were added in the beginning of each section of the survey to serve as guidelines and points of clarification. The required changes to the survey were made and resubmitted for Institutional Review Board (IRB) approval.

Data Collection

Overview of Methods

Survey distribution via e-mail to participants occurred by using Qualtrics®
Survey Software (Qualtrics, 2013). Qualtrics® Survey Software serves as both an e-mail
system and a data collection tool. Following the Dillman methodology, three additional
contacts were made (Dillman, 2000; Dillman et al., 2009). Each e-mail consisted of an
introductory letter (my contact information, IRB contact information, and a brief
overview of the research project), a link to the survey, and a link allowing the recipient to
opt-out of any future contacts. The first additional exchange occurred two weeks after
the first mailing, the second four weeks after, and the third eight weeks after initial
contact (Dillman, 2000; Dillman et al., 2009). After the data collection period, a final e-
mail was sent to participants, thanking them for their assistance.

Participant Selection

PLT participant survey forms in hard copy, paper form was received from Mr.
Harold Anderson, Mississippi PLT Coordinator. PLT participant surveys are completed
at the conclusion of every Mississippi PLT workshop, and names and addresses were
secured from this document. This brief survey provided feedback, facilitator information,
location of the workshop, and contact information of the individuals attending a
workshop. For this study, e-mail addresses provided by participants on the concluding
surveys were used for electronic contact. I chose to convert the hard copies in to
electronic files converting them in to a portable document format (PDF). PDF files were
then merged and formatted into one large document that included all sheets received by
Mr. Anderson. This document was refined by the removal of all extra materials, whereby

the new document only contained the required participant survey forms. All participant surveys outside the 2009-2013 study period were removed. Participant surveys before 2009 and those from 2014 were moved into their own documents and were used in the pilot surveys. Participant surveys that did not include an e-mail address, were unreadable, or contained duplicate e-mail address were removed, reducing the total survey population to 2,450 individuals.

Survey Distribution

E-mail addresses from the target population were typed into a Microsoft Excel® spreadsheet. E-mail addresses were checked for entry errors and corrected as found. I removed all duplicate, illegible, or incomplete e-mail addresses that were identified. When a participant listed two e-mail addresses, the first e-mail listed was selected except in the case of student university e-mail addresses. When a student university e-mail address was listed first with a personal address listed second, I chose the personal e-mail address. This was done to mitigate possible bounced e-mails, as most universities will delete student e-mail accounts after they graduate.

Due to the low response rate during pilot testing, I census surveyed all participants attending PLT workshops from 2009-2013. Contact data from 2,450 individuals was imported into Qualtrics® Survey Software where I created a survey panel. E-mail addresses were checked and were validated after importing correctly.

The initial e-mailing occurred on November 3, 2014. A total of 480 e-mails "hard-bounced;" additionally, 50 individuals opted-out from receiving additional e-mail contacts. A "hard" bounce is identified by a permanent reason (e.g., a deceased individual or deleted account) for the non-deliverability of an e-mail. After adjusting the

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sample to reflect these changes, 1,920 e-mails were distributed again. Additional mailings occurred on November 17th, December 1st, and December 15th. A thank you mailing was sent December 29th to the 89 individuals who completed the survey in its entirety.

The survey was closed January 21, 2015. A total of 89 individuals completed the survey in its entirety, 40 individuals submitted at least a partial survey. This resulted in a 6.72% response rate including partial surveys, and a 4.64% response rate for completed surveys only.

Data Entry, Formatting, Editing, and Analysis

Qualtrics® responses were exported as choice text values with comma delimiter format. Responses were saved as comma separated values (CSV) format to help limit issues with importing into statistical programs. Viewed but unanswered survey questions were recoded to "-99" during export. I exported multiple small files for data analysis, selecting only survey questions needed to answer a particular research question.

All data analysis in this study was completed using the IBM Statistical Package for the Social Sciences® (SPSS) (IBMCorp., 2013). Designed for use in the Social Sciences, IBM SPSS® is well suited for use in survey research. Statistical tests used in this study included one-tailed t-test, independent samples t-test, and analysis of variance (ANOVA). Levene's test for equality of variances was used to authenticate assumptions of equal variances across the sample. Additionally, I used the descriptive statistics feature to create cross-tabulations of data, frequencies outputs, and descriptive outputs.

Multiple independent samples t-tests and ANOVAs were run for each hypothesis. When using ANOVA the use of *post-hoc* tests was limited in this study. Multiple

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ANOVA tests contained groups that included fewer than two cases or fewer than three groups. Additionally, due to the relatively small sample size, fairly discrete variables, and random chance assumptions of equal variances across the sample could not always be verified. Independent samples *t*-tests and ANOVA were used in this study to confirm results and provide robustness to the analysis.

Nonresponse Bias

Nonresponse bias occurs when differences between respondents and nonrespondents exist. For findings in this study to be generalizable, results need to be comparable at all possible response rates (Dooley and Lindner, 2003). There are five general methods for controlling for nonresponse error: ignore nonrespondents, compare the study area population and respondents, compare respondents and nonrespondents, sample nonrespondents, or compare early and late respondents (Miller and Smith, 1983). One widely used approach is the use of late respondents as a proxy for nonrespondents, the underlying assumption being they are similar to nonrespondents (Lahaut et al., 2003). I defined an early respondent as an individual completing the survey before December 1st; late respondents were classified as those completing surveys on or after December 1st. I have chosen to compare early and late respondents to address potential nonresponse error within my study. An independent sample t-test was conducted on four socio-demographic variables and four additional survey question responses. Socio-demographic variables included race, age, employment, and education. The remaining four questions included mean NEP score, mean knowledge score, favorite aspect of workshop, and incorporation of classroom materials.

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Hypothesis: Mississippi teachers who have completed PLT workshops will have NEP scores that reflect pro-environmental views, as defined by NEP scores of 45 or higher.

A CSV file containing results from question one [15 statements from the NEP Assessment (Dunlap, 2008; Dunlap and Van Liere, 1978)] was imported into SPSS®. Responses were coded into values "1" through "5." The higher an individual's score on the NEP Scales, the more ecocentric of a worldview that individual held. In odd numbered statements, "strongly agree" represented the most ecocentric worldview, while in even numbered statements "strongly disagree" represented this worldview. Participants' responses were coded using this scale (Table 3.2).

In cases where individuals answered the majority of NEP statements but left some unanswered, these statements were coded as "3," representing a neutral value. When the majority of NEP statements were left unanswered, the respondent was removed from the sample. A single respondent was removed from analysis because they left all 15 statements unanswered. A summation of coded values per respondent was their NEP score.

Table 3.2   Numeric values of New Environmental Paradigm (NEP) statements

NEP Statement	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
We are approaching the limit of the number of people the Earth can support	5	4	3	2	1
Humans have the right to modify the natural environment to suit their needs	1	2	3	4	5
When humans interfere with nature, it often produces disastrous consequences	5	4	3	2	1
Human ingenuity will insure that we do not make the Earth unlivable	1	2	3	4	5
Humans are severely abusing the Earth	5	4	3	2	1
The Earth has plenty of natural resources if we just learn how to develop them	1	2	3	4	5
Plants and animals have as much right as humans to exist	5	4	3	2	1
The balance of nature is strong enough to cope with the impacts of modern industrial nations	1	2	3	4	5
Despite our special abilities, humans are still subject to the laws of nature	5	4	3	2	1
The so-called "ecological crisis" facing humankind has been greatly exaggerated	1	2	3	4	5
The Earth is like a spaceship with very limited space and resources	5	4	3	2	1
Humans were meant to rule over the rest of nature	1	2	3	4	5
The balance of nature is very delicate and easily upset	5	4	3	2	1
Humans will eventually learn enough about how nature works to be able to control it	1	2	3	4	5
If things continue on their present course, we will soon experience a major environmental catastrophe	5	4	3	2	1

Notes: Numeric values of New Environmental Paradigm (NEP) statements by statement as seen in a Mississippi Project Learning Tree (PLT) participant survey conducted on traditional school teachers attending PLT from 2009-2013.
NEP statements were coded with values "1"-"5."
Five represented ecocentric worldview, while values of one were representative of anthropocentric worldviews.

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Hypothesis: Motivation to attend PLT workshops is not affected by a teacher's NEP score.

The respondents' NEP scores file was merged with a file containing responses to motivations to attend PLT workshops. There were nine possible motivations available to respondents. Responses were coded as "1" and "0." Such that "1" represented a respondent selecting a motivation, "0" indicating a motivation was not selected. All "-99" values were coded as "0" representing a response that was not selected. Participants were able to select one or more of the following as their motivation for attending PLT workshops:

A. Recommendations from a colleague/administrator

B. Participated in past professional development programs and was interested in other programs

C. Offered credit for participating in workshop

D. Wanted to be more knowledgeable on forest practices and natural resource information

E. Wanted to integrate more environmental education into my lesson plans and classroom lectures

F. Wanted to be able to teach forestry and natural resources to students

G. Wanted to encourage my students to connect to nature

H. Wanted to incorporate more science/STEM into my lesson plans and classroom lectures

I. Other

Hypothesis: Teachers will score 50% (five correct answers) or more on the knowledge assessment.

Responses from the knowledge section of the survey were imported. Text values were coded as "1" and "0." Values "-99" codes were assigned as "0" when other knowledge assessment questions were attempted. If no other knowledge assessment questions were attempted, "-99" values were coded as missing values and removed from the sample. The questions included in the knowledge assessment were:

1. Which of the following below is an example of point-source pollution?

2. Approximately what fraction of the Earth is covered in water?

3. Which is not part of a tree's trunk?

4. What is the function of xylem in a tree?

5. What is the function of cambium in a tree?

6. Which is not a function of a tree's roots?

7. Public and private forest cover nearly ____of our nation's land.

8. The Multiple Use and Sustained Yield Act of 1960 required that National Forests must be managed how?

9. What is habitat fragmentation?

Hypothesis: Teachers will have incorporated one or more PLT lessons into classroom teaching.

There were three possible selections for respondents to select. These responses were "yes," "no," and "not sure." Responses were coded so as "1" referred to a "yes" response and "0" represented "no." Responses of "not sure" were coded as "0" as well. In this section, "-99" values were coded as missing values and removed from the sample.

Hypothesis: Teachers' subject area will not affect the amount of PLT lessons incorporated into classroom teaching.

Teacher discipline areas were first grouped into six primary subject areas

including math, science, English language arts (ELA), social studies, arts, and other

(Table 3.3). Overarching areas were coded into numeric values "1" through "6." A value

of "1" represented math, "2" science, "3" ELA, "4" social studies, "5" arts, and "6" other.

Table 3.3   Primary discipline areas used for analysis

Discipline for analysis	Coded Value	Subject response
Math	1	Math
Science	2	Agriculture, Biology, Forestry, Chemistry, Marine/Environmental Science, All Science
English language arts (ELA)	3	Reading, Language, English
Social Studies	4	Mississippi Studies, Geography, History, Government/Economics
Arts	5	Music
Other	6	Gifted Education, Applied Engineering, Safety and Technology (AEST), K-2, Library Media, Health, Special Education

Notes: Primary discipline areas used for analysis of a Mississippi Project Learning Tree (PLT) participant survey conducted on traditional school teachers attending PLT from 2009-2013. Table includes a list of primary discipline areas used for analysis, as well as, the participant responses included within each discipline area.

Additionally, the number of PLT lessons incorporated into classroom teaching

was coded into numeric values. Responses of "0-5"were coded as "1," "6-10" coded as

"2," "11-15" coded as "3," and "16-20" coded as "4." In the survey, it was possible to

select "greater than 20;" however, this response was not selected and therefore not coded.

Responses of "-99" were coded as missing values and removed from the sample.

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Hypothesis: Teachers' motivation for incorporating will not affect the amount of PLT lessons in classroom teaching.

Seven possible motivations for incorporation of PLT lessons were available for selection on the survey. Responses were coded into "1" and "0." Coding a response as "1" represented a respondent who selected this motivation, "0" meant it was not selected. All "-99" values were coded as "0" representing a response that was not selected. Participants were able to select one or more of the following as their motivation for incorporating PLT lessons into their classroom teaching:

    A. Provide hands-on experience

    B. Raise awareness of environmental issues

    C. Met common core/state standards

    D. Substitute for other lesson plans

    E. Get students outside of the classroom

    F. Compliments existing lessons

    G. Other

Additionally, the number of lessons incorporated into classroom teaching was coded into numeric values. Responses of "0-5" were coded as "1," "6-10" coded as "2," "11-15" coded as "3," and "16-20" coded as "4." In the survey, it was possible to select "greater than 20;" however, this response was not selected and therefore not coded. Responses of "-99" were coded as missing values and removed from the sample.

Research Question Three

Responses used in answering research question three were not coded into numeric values for analysis. These statements were recorded and used as a baseline for future

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studies, as well as for providing conclusions and recommendations for this study. While

the numeric data provided key results for this research, it was not necessary for

evaluation of research question three.

CHAPTER IV

RESULTS

Response Rate

A total of 129 individuals submitted at least a partially completed survey and, of these, 89 completed the survey in its entirety. Participants who were eligible for skip and display logics were not counted as incomplete as long as they completed the questions displayed to them. This resulted in 6.72% response rate, including partial surveys, and a 4.64% response rate for completed surveys only.

Nonresponse Bias

I have chosen to compare early and late respondents to address potential nonresponse error within my study. Independent sample *t*-test and ANOVAs were conducted on four sociodemographic variables and four additional survey question responses. Socio-demographic variables included race, age, employment, and education. The remaining four questions included mean NEP score, mean knowledge score, favorite aspect of workshop, and incorporation of classroom materials. I defined an early respondent as an individual completing the survey before December 1st; late respondents were classified as those completing surveys on or after December 1st.

The majority of early to late respondent comparisons indicated no significance. However, statistical significance was found in one of the eight areas being compared.

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The mean overall knowledge score was identified as statistically significant (t (102)=2.58, p=0.011, α=0.05). The assumption of homogeneity of variances was tested and verified using Levene's Test (F (102)=0.58, p=0.447). Early respondents scored statistically higher (n=59, $\bar{x}$=6.54) mean knowledge scores than late respondents (n=45, $\bar{x}$= 5.76). Since significance was not found in other areas, it is possible that the respondent sample is representative of the survey population; however, it is impossible from this sample to conclude on additional generalizability with certainty.

Findings and Data Analysis

Socio-demographic Analysis

Sample sizes will differ across questions to reflect variations in response rate. Of those respondents who elected to complete the socio-demographic portion of the survey, 81% were female (n=73) and 17% male (n=15). Two individuals preferred not to disclose their gender. Most respondents were Caucasian (n=72, 81%), followed by African American/Black (n=10, 11%). A majority of the sample population obtained a Bachelor's degree or higher (n=88, 99%). Respondents ranged in age from 20-69, with most respondents between the ages of 50-59 (n=30, 33%). Primary grade of students being taught at the time of the survey was widely distributed throughout all grade levels. Respondents were allowed to select multiple grades if they were teaching in mixed level classrooms or if teaching multiple grades at once. Many respondents did select multiple grades of their primary students; therefore, a teacher may be responsible for more than one grade designation (Figure. 4.1).

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Primary Grades of Student
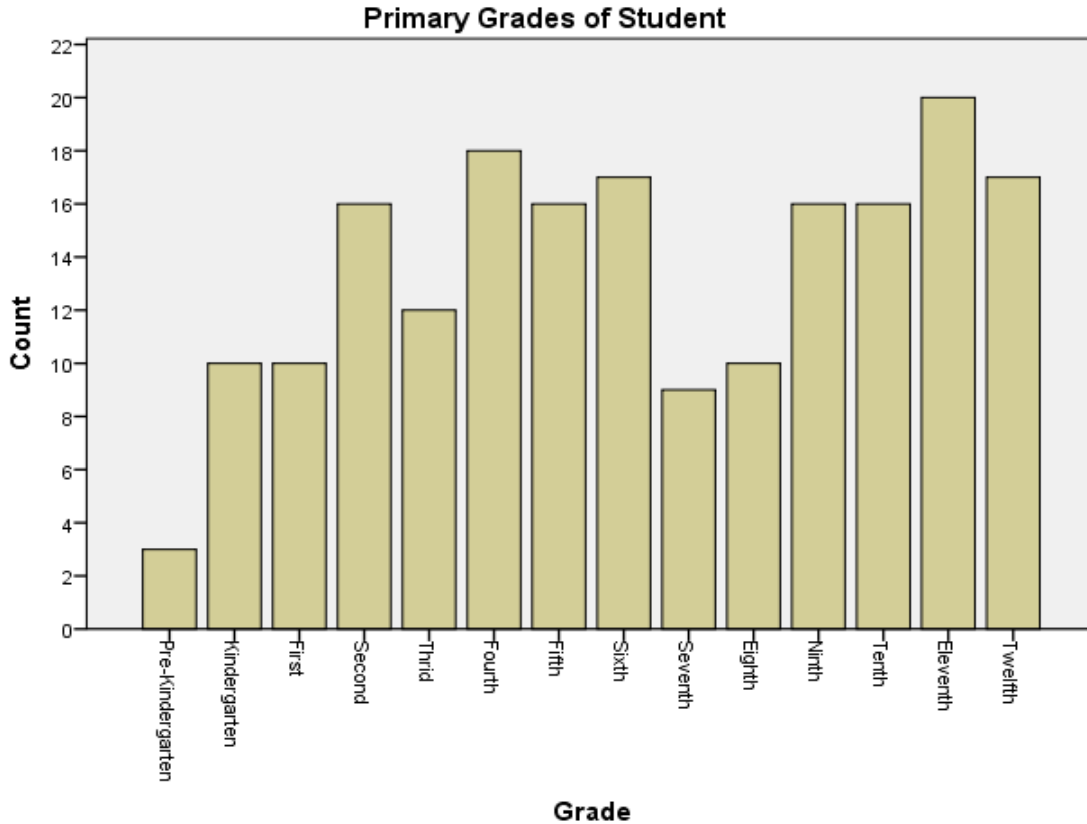
Figure 4.1   Self-reported grade levels of students taught as reported on a web-based teacher survey

Notes: Self-reported grade levels of students taught as reported on a web-based teacher survey by Mississippi teachers' during the 2014/2015 school year for those who participated in Project Learning Tree (PLT) from 2009-2013.
Respondents selected multiple grades if teaching multiple level classrooms.

Findings by Research Question

Question One: What is the environmental awareness of teachers who have completed a Project Learning Tree workshop in Mississippi

H_{1A}: *Mississippi teachers who have completed PLT workshops will have NEP scores that reflect pro-environmental views, as defined by NEP scores of 45 or higher.*

The total NEP score for each respondent (N=128) was calculated using the summation function of SPSS after data was coded. The mean NEP score in this study was 50.69. The possible score range was 15-75, with the minimum in this study at 23

and the maximum at 67 (4.2). A one-sample *t*-test was conducted on the NEP scores

to determine if the sample mean was statistically different from the test mean of 45, as

stated in my hypothesis as a threshold for defining an ecocentric worldview. The sample

mean of 50.69 (*SD*=7.02) was significantly different from 45 (*t* (127)=9.17, *p*=0.000

($1.10E^{-15}$) at α=0.05), thus supporting the conclusion that PLT trained Mississippi

teachers have NEP scores that reflect pro-environmental worldviews.
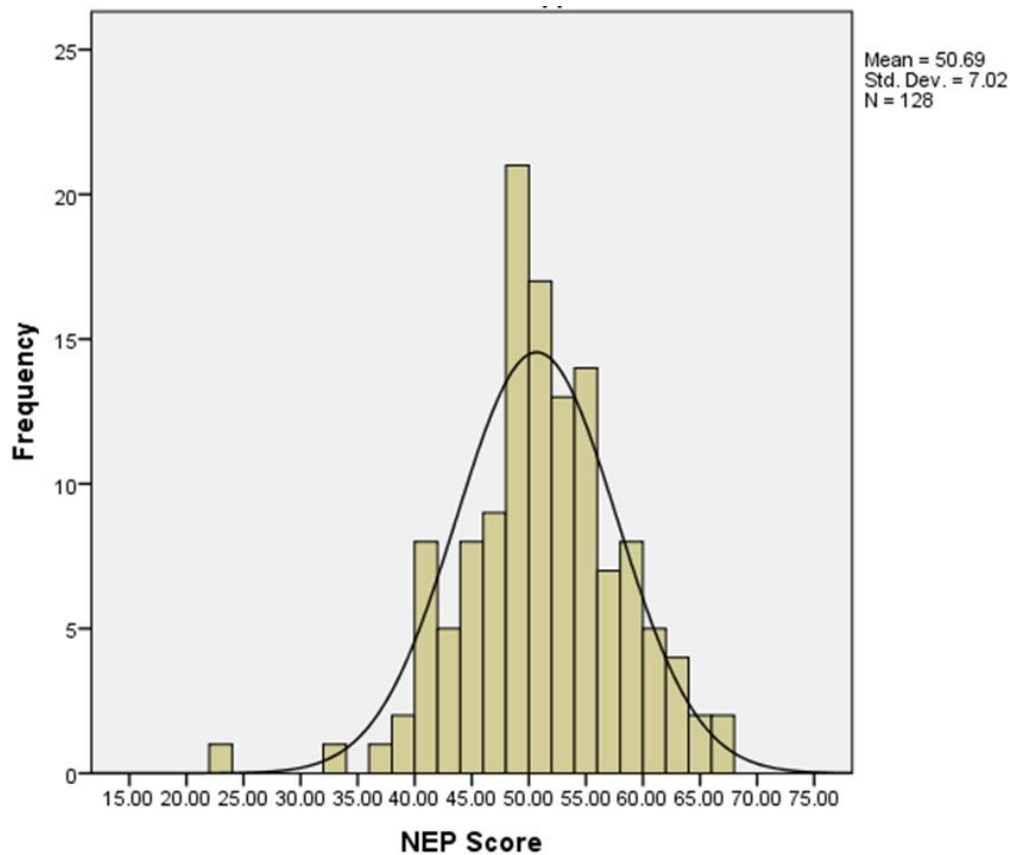
Figure 4.2   New Environmental Paradigm (NEP) scores of Mississippi Project
              Learning Tree (PLT) trained traditional school teachers in Mississippi

Notes: New Environmental Paradigm (NEP) scores of Mississippi Project Learning Tree (PLT)
trained traditional school teachers in Mississippi who attended PLT from 2009-2013 and
frequency in which scores occurred, within a normal distribution curve.

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H_{1B}: Individual's motivation to attend PLT workshops is not affected by a teacher's NEP score.

Participants were provided with nine statements that described their possible motivations for attending PLT workshops (Velardi, 2014). An independent samples *t*-test and ANOVA were conducted to compare the mean NEP score between selecting a motivation and not selecting that motivation. Three motivations were identified, as having statistically different means in both an independent samples *t*-test and ANOVA tests.

Participants selected one or more of the following as their motivation for attending PLT workshops:

    A. Recommendations from a colleague/administrator

    B. Participated in past professional development programs and was interested in other programs

    C. Offered credit for participating in workshop

    D. Wanted to be more knowledgeable on forest practices and natural resource information

    E. Wanted to integrate more environmental education into my lesson plans and classroom lectures

    F. Wanted to be able to teach forestry and natural resources to students

    G. Wanted to encourage my students to connect to nature

    H. Wanted to incorporate more science/STEM into my lesson plans and classroom lectures

    I. Other

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Ninety-two individuals responded by selecting a motivation(s) for attending a PLT workshop. The number of responses for each motivation was recorded (Table 4.1).

Table 4.1   Total number of responses for each motivation for attending Mississippi Project Learning Tree (PLT) workshop

Motivations	Number of Respondents
Recommendations from a colleague/administrator	25
Participated in past professional development program and was interested in other programs	20
Offered credit for participating in workshop	64
Wanted to be more knowledgeable on forest practices and natural resource information	33
Wanted to integrate more environmental education into my lesson plans and classroom lectures	34
Wanted to be able to teach forestry and natural resources to students	19
Wanted to encourage my students to connect to nature	40
Wanted to incorporate more science/STEM into my lesson plans and classroom lectures	25
Other	3

Notes: Total number of responses for each motivation for attending Mississippi Project Learning Tree (PLT) workshop selected by PLT trained traditional school teachers in Mississippi. Teachers were trained in PLT from 2009-2013.

The majority (n=64, 70%) of respondents stated that they participated in a PLT workshop because they were offered credit for participation. In Mississippi, PLT workshops can be used to earn Continuing Education Credits (CEUs) needed by in-service teachers. Additionally, respondents identified that participation in PLT was a requirement in college courses they were enrolled in at the time of their participation in

PLT. In Mississippi, many in-service teachers participated in PLT as a preservice teacher during their teacher training.

<div align="center">Independent Samples t-test Results</div>

Motivations E, G, and H showed statistical differences in mean NEP scores in an independent samples t-test (t (90)=-2.78, p=0.007, α= 0.05; t (90)=-3.39, p=0.001, α= 0.05; t (90)=-3.25, p=0.00, α= 0.05) (Table 4.2). Respondents selecting motivation E (n=34) had statistically higher NEP scores ($\bar{x}$=53.53) than those not selecting this motivation (n=58, $\bar{x}$=49.26, t (90)=-2.78, p=0.007, α= 0.05). The assumption of homogeneity of variances was verified using Levene's Test (F (90)=0.23, p=0.633). Respondents selecting Motivation G (n=40) had a statistically higher ($\bar{x}$=53.65, t (90)=-3.39, p=0.001, α= 0.05) mean NEP score as compared to those not selecting this motivation (n=52, $\bar{x}$=48.67). Assumptions of homogeneity of variances was tested and verified using Levene's Test (F (90)=0.39, p=0.534). Additionally, motivation H had statistically higher (n=25, $\bar{x}$=54.72, t (90)=-3.25, p=0.002, α= 0.05,) mean NEP scores than those individuals not selecting this motivation (n=67, $\bar{x}$=49.39). Assumptions of homogeneity of variances was tested and verified using Levene's Test, F (90)=0.09, p=0.771.

Table 4.2   Independent samples *t*-test results of motivations to attend Mississippi
            Project Learning Tree (PLT) workshop

Motivation	Selected Motivation		Did not select motivation		*t*-value	*p*-value
	Mean NEP score	Number of responses	Mean NEP score	Number of responses		
A	51.08	25	50.75	67	-0.19	0.848
B	53.25	20	50.17	72	-1.67	0.098
C	50.68	64	51.13	28	0.27	0.786
D	51.79	33	49.26	59	-0.93	0.358
E	53.53	34	49.26	58	-2.78	0.007*
F	52.42	19	50.42	73	-1.05	0.295
G	53.65	40	48.67	52	-3.39	0.001*
H	49.38	25	54.72	67	-3.25	0.002*
I	52.43	3	50.71	89	-0.59	0.555

Notes: Independent samples t-test results of motivations to attend Mississippi Project Learning
Tree (PLT) workshop reported in 2014 by PLT trained traditional school teachers in Mississippi
(N=92) compared to their mean New Environmental Paradigm (NEP) score.
Teachers were trained in PLT from 2009-2013.
Statistically different results denoted by * at α=0.05.
Motivations included A) Recommendations from a colleague/administrator, B) Participated in
past professional development programs and was interested in other programs, C) Offered credit
for participating in workshop, D) Wanted to be more knowledgeable on forest practices and
natural resource information, E) Wanted to integrate more environmental education into my
lesson plans and classroom lectures, F) Wanted to be able to teach forestry and natural resources
to students, G) Wanted to encourage my students to connect to nature, H) Wanted to incorporate
more science/STEM into my lesson plans and classroom lectures, and I) Other.

ANOVA Results

ANOVA detected statistical differences between mean NEP scores of Motivations

E, G, and H (Table 4.3). The mean NEP score differed significantly between individuals

selecting motivation E ($F_{(1, 90)}$=7.73, *p*=0.007, α= 0.05) and all other motivations.

Mean NEP scores of individuals selecting motivation G ($F_{(1, 90)}$=11.50, *p*=0.001, α=

0.05) were statistical different from all other motivations. Finally, motivation H mean

NEP score was statically different ($F_{(1, 90)}$=10.53, *p*=0.002, α= 0.05) from all other

motivations. *Post-hoc* analysis was not performed. Multiple motivations were often

selected by the same individual, therefore motivations were not independent. Each

ANOVA consisted of two groups (selecting and not selecting a motivation), *post-hoc* is

not preformed when less than three groups are present.

Table 4.3   Analysis of Variance results of motivations to attend Mississippi Project
            Learning Tree (PLT) workshop

		Sum of Squares	Df	Mean Square	F	$p\text{-value}$
Motivations						
	Between Groups	2.03	1	2.03	0.04	0.848
A	Within Groups	4940.53	90	54.90		
	Total	4942.55	91			
	Between Groups	148.80	1	148.80	2.79	0.098
B	Within Groups	4793.75	90	53.26		
	Total	4942.55	91			
	Between Groups	4.07	1	4.07	0.07	0.786
C	Within Groups	4938.48	90	54.87		
	Total	4942.55	91			
	Between Groups	46.53	1	46.53	0.86	0.358
D	Within Groups	4896.02	90	54.40		
	Total	4942.55	91			
	Between Groups	390.96	1	390.96	7.73	0.007*
E	Within Groups	4551.59	90	50.57		
	Total	4942.55	91			
	Between Groups	60.09	1	60.09	1.11	0.295
F	Within Groups	4882.47	90	54.25		
	Total	4942.55	91			
	Between Groups	560.01	1	560.01	11.50	0.001*
G	Within Groups	4382.54	90	48.70		
	Total	4942.55	91			
	Between Groups	514.60	1	517.60	10.53	0.002*
H	Within Groups	4424.95	90	49.17		
	Total	4942.55	91			
	Between Groups	19.19	1	19.19	0.35	0.555
I	Within Groups	4923.36	90	54.70		
	Total	4342.55	91			

Notes: Analysis of Variance results of motivations to attend Mississippi Project Learning Tree
(PLT) workshop reported in 2014 by PLT trained traditional school teachers in Mississippi
(N=92) compared to their mean New Environmental Paradigm (NEP) score.
Teachers were trained in PLT from 2009-2013.
Statistically different results denoted by * at α=0.05.
Motivations included A) Recommendations from a colleague/administrator, B) Participated in
past professional development programs and was interested in other programs, C) Offered credit
for participating in workshop, D) Wanted to be more knowledgeable on forest practices and
natural resource information, E) Wanted to integrate more environmental education into my
lesson plans and classroom lectures, F) Wanted to be able to teach forestry and natural resources
to students, G) Wanted to encourage my students to connect to nature, H) Wanted to incorporate
more science/STEM into my lesson plans and classroom lectures, and I) Other.

Question Two: Do teachers implement the Project Learning Tree curriculum acquired during a Project Learning Tree workshop?

H_{2A}: Teachers will score 50% (five correct answers) or higher on the knowledge assessment.

Mean knowledge test score of respondents (N=105) was 6.17 (*SD* =1.69). Possible score range was 0-9, with a reported minimum score of 0 and a maximum of 9. A one-sample *t-test* was conducted on the knowledge assessment to determine whether this sample's mean was statistically different from the mean of five, as stated in my hypothesis as a threshold value. The sample mean was significantly different from five (*t* (104)=7.10, *p*=0.000 at α= 0.05). This supports the conclusion that teachers that have attended PLT workshops have basic ecological knowledge. Mean knowledge score is representative of knowledge of the PLT content post workshop, as I am unable to determine if this knowledge was acquired and recalled solely from PLT workshops.

The majority of respondents correctly answered six of the nine possible questions. Correct answers were selected in independent questions with participants scoring 50% or more with the exception of question number eight. Question eight addressed the management of National Forests established by The Multiple Use and Sustained Yield Act of 1960. Only 23.8% (n=25) of respondents selected the correct answer to this question (4.3). This question represented a very specific range of knowledge when compared to other questions in the knowledge assessment. This may have been a contributing factor leading to the lower number of correct responses received.
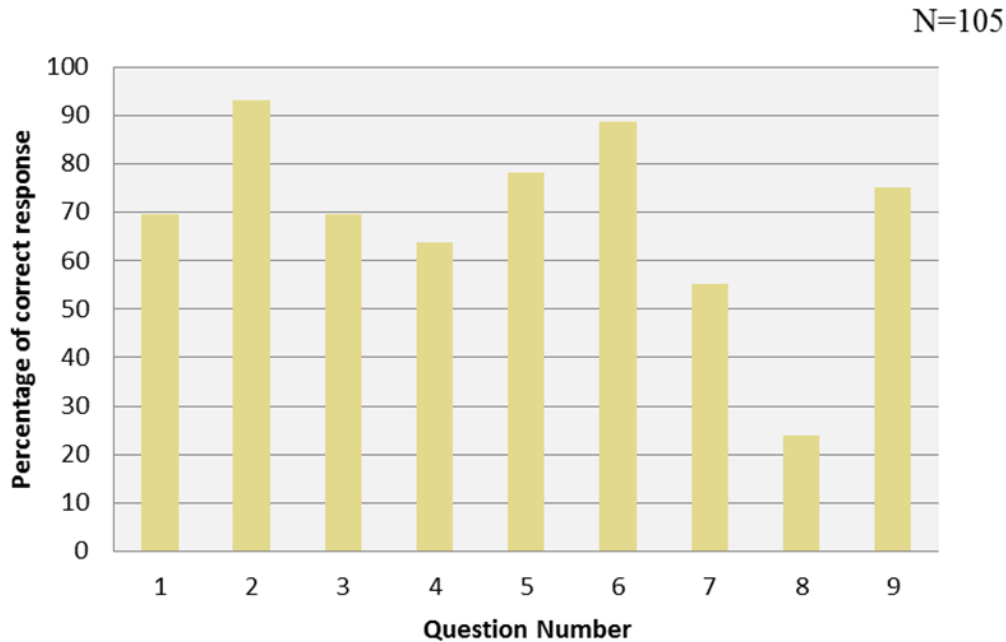
Figure 4.3   Percentages of correct responses to a Project Learning Tree (PLT) knowledge assessment

Notes: Percentages of correct responses to a Project Learning Tree (PLT) knowledge assessment (N=105) presented to PLT trained traditional school teachers in Mississippi whom attended PLT from 2009-2013.
Questions were derived from three Project Learning Tree (PLT) lessons highly used during PLT workshops.
These questions were: 1)Which of the following below is an example of point-source pollution?, 2)Approximately what fraction of the Earth is covered in water?, 3)Which is not part of a tree's trunk?, 4)What is the function of xylem in a tree?, 5)What is the function of cambium in a tree?, 6)Which is not a function of a tree's roots?, 7)Public and private forest cover nearly ____of our nation's land., 8) The Multiple Use and Sustained Yield Act of 1960 required that National Forests must be managed how?, 9)What is habitat fragmentation?.

H_{2B}: *Teachers will have incorporated one or more PLT lessons into classroom teaching.*

A majority of respondents self-reported use of PLT lessons. Using IBM SPSS frequency functions, the usage of PLT materials was established. Respondents were asked whether they included PLT lessons into their classroom curricula. Seventy-six individuals, or 75% of respondents (N=101) selected that they did use PLT lessons. Thirteen individuals (13%) selected "no" and 12 (12%) selected "not sure."

H₂C: Teachers' subject area will not affect the frequency of use of PLT lessons incorporated into classroom instruction.

Respondents (N=43) identified their major teaching subject area. I then completed an independent samples *t*-test and ANOVA to compare the mean number of lessons incorporated into classroom teaching. No subject areas were identified as having a significant difference in the mean number of PLT lessons incorporated into classroom teaching. A majority of respondents, 75%, reported that they used between one to five different PLT lessons per school year.

Independent Samples t-test Results

No significant difference in the mean number of PLT lessons incorporated into classroom teacher was identified by an independent samples *t*-test (Table 4.4). A single individual represented the subject area "Arts." This resulted in zero variance within groups and thus I was not able to conduct an assumption of homogeneity of variances (i.e., Levene's Test). I chose not to combine the subject of "Arts" with the "Other" subject area. "Arts" represents a major area of teaching and I felt it was important to keep this primary area separate. The subject area of "Science" had the highest amount of lessons being incorporated ($\bar{x}$=1.67). Areas of "English Language Arts (ELA)" and "Math" had the lowest mean incorporation ($\bar{x}$=1.17). The subject area "Arts" had a mean of 1.00; however, this value is representative of a single individual and was not viewed as having the lowest usage for this reason.

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Table 4.4   Independent samples *t*-test results of Mississippi Project Learning Tree (PLT) trained teachers' subject area

Subject area	Teach subject		Do not teach subject			
	Mean number of lessons	Number of responses	Mean number of lesson	Number of responses	*t*-value	*p*-value
Math	1.17	6	1.46	35	0.85	0.402
Science	1.67	15	1.25	28	-1.76	0.087
ELA	1.17	6	1.43	37	0.76	0.434
Social Studies	1.20	5	1.42	38	0.61	0.548
Arts	1.00	1	1.40	42	0.52	0.605
Others	1.50	8	1.37	35	-0.43	0.671

Notes: Independent samples t-test results of Mississippi Project Learning Tree (PLT) trained teachers' subject area (N=43) and mean number of PLT lessons incorporated into traditional classrooms as reported in a 2014 PLT participant survey.
Teachers were trained in PLT from 2009-2013.
Subject area of Arts had zero variance, thereby unable to perform Levene's Test.
Subject area of English language arts is abbreviated ELA.
Mean number of lessons being taught in traditional classrooms are coded value means.
Number of lessons taught were coded "0-5" represented by "1,""6-10" represented by "2," "11-15" represented by "3," "16-20" represented by "4,"and "20 or more" represented by " 5."

ANOVA Results

No subjects were identified as significantly different through the ANOVA test (Table 4.5). It should be noted that the subject area of "Arts" only included a single case and, therefore, was incorporated into the "Others" area so that ANOVA analysis could include *post-hoc* tests. *Post-hoc* Tukey's HSD tests showed no significant comparisons.

Table 4.5   Analysis of Variance results of Mississippi Project Learning Tree (PLT)
            trained teachers' subject area

	Sum of Squares	df	Mean Square	F	*p-value*
Between Groups	1.06	4	0.26	1.02	0.413
Within Groups	8.84	34	0.26		
Total	9.90	38			

Notes: Analysis of Variance results of Mississippi Project Learning Tree (PLT) trained teachers'
subject area (N=43) and mean number of PLT lessons incorporated into traditional classrooms as
reported in a 2014 PLT participant survey.
Teachers were trained in PLT between 2009-2013.
Subject area of Arts was included in the Others category.

*H_{2D}: Teachers' motivation for incorporation will not affect the frequency of use of PLT
lessons in classroom instruction.*

Participants were provided with seven statements which described their

motivations for including PLT lesson in their classrooms (Velardi, 2014). I then

completed an independent samples *t*-test and ANOVA to compare the mean number of

lessons incorporated into classrooms. Four motivations were identified as having

statistically different means in both statistical tests. Multiple motivations were identified

as having zero variance within group and equal variances could not be assumed, between

groups, using Levene's Test. This result is believed to be a result of a small sample size,

a fairly discrete set of variables, and random chance.

Participants were able to select one or more of the following as their motivation

for incorporating PLT lessons into their classroom teaching:

A. Provide hands-on experience

B. Raise awareness of environmental issues

C. Met common core/state standards

D. Substitute for other lesson plans

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E. Get students outside of the classroom

F. Compliments existing lessons

G. Other

Seventy-seven individuals responded by selecting a motivation(s) for attending a PLT workshop.

Independent Samples t-test Results

Motivations A, C, E, and F were identified as having statistically differences between means number of PLT lessons incorporated (Table 4.6). Respondents selecting motivation A (n=56) had a statistically higher mean number of PLT lessons incorporated into classroom teaching ($\bar{x}$=1.43) than those individuals not selecting this motivation (n=20, $\bar{x}$=1.00, t (55)=-4.52, p=0.000, α= 0.05). The assumption of homogeneity of variances was tested and statistical differences were found among means using Levene's Test (F (74) =35.86, p=0.000, α= 0.05). Respondents selecting Motivation C (n=27) had a statistically higher mean number of lessons incorporated ($\bar{x}$=1.56) compared to those not selecting this motivation (n=49, $\bar{x}$=1.18, t (40.4)=-2.28, p=0.028, α= 0.05). The assumption of homogeneity of variances was tested and equal variances could not be assumed using Levene's Test (F (74)=9.16, p=0.003, α= 0.05). Motivation E had a statistically higher (n=35, $\bar{x}$=1.49, t (63.6)=-2.16, p=0.035, α= 0.05) mean number of PLT lessons incorporated than those not selection motivation E (n=41, $\bar{x}$=1.17). The assumption of homogeneity of variances was tested and equal variances could not be assumed using Levene's Test (F (74)=8.63, p=0.004, α= 0.05). Finally, respondents selecting motivation F (n=52) had a statistically higher mean number of PLT lessons

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incorporated into classroom teaching (x̄=1.46) than individuals not selecting this

motivation (n=24, x̄= 1.00, *t* (51)=-4.58, *p*=0.000 , α= 0.05). The assumption of

homogeneity of variances was tested and equal variances could not be assumed using

Levene's Test (*F* (74)=45.93, *p*=0.000, α= 0.05). Motivation D and G were the only

motivations to meet the assumption of homogeneity of variances.

Table 4.6   Independent samples *t*-test results for Mississippi Project Learning Tree (PLT) trained teachers motivation for incorporating PLT lessons into their traditional classrooms

	Selected motivation		Did not select motivation			
Motivation	Mean number of lessons	Number of responses	Mean number of lessons	Number of responses	*t*-value	*p*-value
A	1.43	56	1.00	20	-4.52	0.000*
B	1.38	53	1.17	23	-1.60	0.114
C	1.56	27	1.18	49	-2.28	0.028*
D	1.67	3	1.30	73	-0.97	0.334
E	1.49	35	1.17	41	-2.16	0.035*
F	1.46	52	1.00	24	-4.58	0.000*
G	1.25	4	1.32	72	0.21	0.834

Notes: Independent samples t-test results for Mississippi Project Learning Tree (PLT) trained teachers motivation for incorporating PLT lessons into their traditional classrooms (N=77) and number of PLT lessons incorporated as reported in a 2014 PLT participant survey.
Teachers were trained in PLT from 2009-2013.
Motivations available to select included A) Provide hands-on experience, B) Raise awareness of environmental issues, C) Met common core/state standards, D) Substitute for other lesson plans, E) Get students outside of the classroom, F) Compliments existing lessons G) Other.
Mean number of lessons being taught in traditional classrooms are coded value means.
Number of lessons taught were coded "0-5" represented by "1,""6-10" represented by "2," "11-15" represented by "3," "16-20" represented by "4,"and "20 or more" represented by " 5."
Equal variances not assumed denoted by +, statistically different results denoted by * at α=0.05.

ANOVA Results

Motivations A, C, E, and F were identified as having statistical differences among

means resulting from a one-way ANOVA (Table 4.7). The mean number of PLT lessons

incorporated differed significantly between individuals selecting motivation A (*F*

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(1,74)=7.23, p=0.009, α= 0.05) and all other motivations. Mean number of PLT lessons incorporated into classroom teaching of individuals selecting motivation C were statistically different from all other motivations (F (1,74)=6.36, p=0.014,α= 0.05). Individuals selecting motivation E had a statistically different mean of PLT lessons incorporated into classroom teaching (F (1,74)=4.86, p=0.031, α= 0.05). Finally, statistical differences in mean number of PLT lessons incorporated were identified in individuals selection motivation F (F (1,74)=9.61, p=0.003, α= 0.05). *Post-hoc* analysis was not performed because the same individual often selected multiple motivations, therefore motivations were not independent. Each ANOVA consisted of two groups (selecting and not selecting a motivation), *post-hoc* is not preformed when less than three groups are present.

Table 4.7   Analysis of Variance results for Mississippi Project Learning Tree (PLT) trained teachers motivation for incorporating PLT lessons into their traditional classrooms

		Sum of Squares	df	Mean Square	F	*p*-value
Motivation						
A	Between Groups	2.71	1	2.71	7.23	0.009*
	Within Groups	27.71	74	0.38		
	Total	30.42	75			
B	Between Groups	0.66	1	0.66	1.65	0.203
	Within Groups	29.76	74	0.40		
	Total	30.42	75			
C	Between Groups	2.41	1	2.41	6.36	0.014*
	Within Groups	28.01	74	0.38		
	Total	30.42	75			
D	Between Groups	0.39	1	0.39	0.95	0.334
	Within Groups	30.04	74	0.41		
	Total	30.42	75			
E	Between Groups	1.87	1	1.87	4.86	0.031*
	Within Groups	28.55	74	0.39		
	Total	30.42	75			
F	Between Groups	3.50	1	3.50	9.61	0.003*
	Within Groups	26.92	74	0.36		
	Total	30.42	75			
G	Between Groups	0.02	1	0.02	0.04	0.834
	Within Groups	30.40	74	0.41		
	Total	30.42	75			

Notes: Analysis of Variance results for Mississippi Project Learning Tree (PLT) trained teachers motivation for incorporating PLT lessons into their traditional classrooms (N=77) and number of PLT lessons incorporated as reported in a 2014 PLT participant survey.
Teachers were trained in PLT from 2009-2013.
Motivations available to select included A) Provide hands-on experience, B) Raise awareness of environmental issues, C) Met common core/state standards, D) Substitute for other lesson plans, E) Get students outside of the classroom, F) Compliments existing lessons G) Other.
Statistically significant results denoted by * at α=0.05.

Question Three: What challenges exist that limit implementation of Project Learning Tree curriculum and what incentives can be provided to mitigate these challenges?

Respondents answered a series of questions relating to challenges to implementing PLT lessons and incentives for increasing attendance in PLT workshops and incorporation of PLT lessons. Eighty-two individuals responded to questioning related to the challenges of incorporating PLT lessons into the classroom. Ninety individuals responded to the question asking for best practices to encourage more teachers to participate in EE workshops, and 91 responded to a similar question relating to incorporation of environmentally based lessons, including PLT, into classroom teaching.

Challenges

When asked to identify the greatest challenge to implementing PLT lessons into classrooms multiple respondents (n=39, 48%) stated that they feel they do not have the time to implement these activities (4.4). Twenty-eight percent (n=23) stated that PLT lessons did not match or fit into their current curriculum. Nine respondents did not remember the PLT activities well enough to use them in their classrooms, and one individual reported that they were not comfortable enough with the lessons to teach them to their students. No respondents reported failure to implement PLT lessons due to lack of interest, engagement, or excitement of their students.
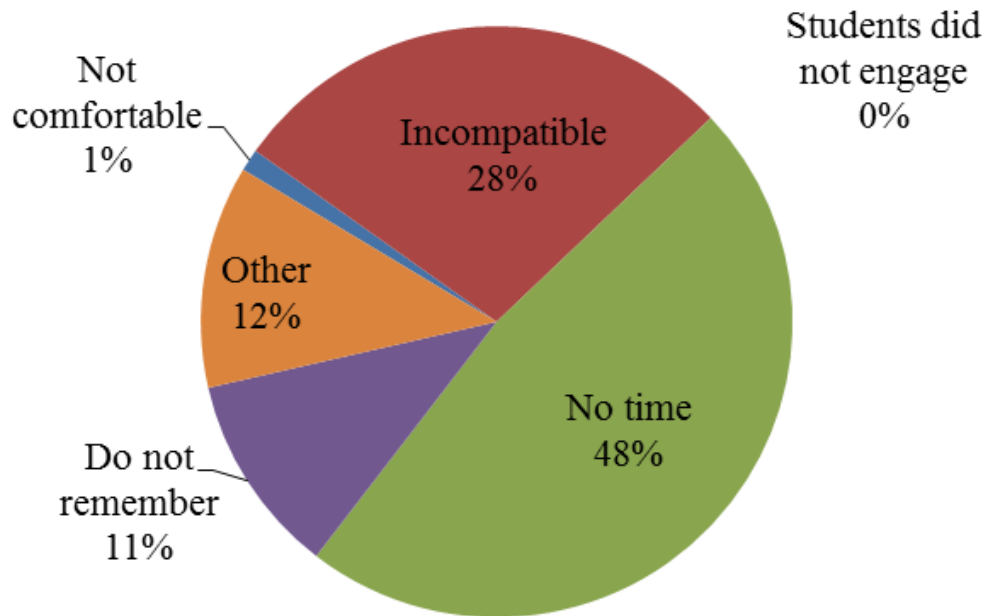
Figure 4.4   Greatest challenges to implementing Project Learning Tree (PLT) lessons
            into traditional classrooms

Notes: Greatest challenges to implementing Project Learning Tree (PLT) lessons into traditional
classroom in Mississippi as identified by Mississippi PLT trained teachers (N=82) as reported in
a 2014 PLT participant survey.
Teachers were trained in PLT from 2009-2013.

Incentives

Participants felt strongly that the best way to encourage more teachers to attend

EE-based workshops was monetary compensation (n=73, 81%) (4.5). Additional

funds for classrooms of teachers who attend EE-based workshops was the most

commonly selected response (n=55, 61%). Other individuals felt that a personal salary

increase (n=18, 20%) was a better incentive than funding for classrooms. Non-monetary

incentives were also identified; improved convenience and availability of workshops, free

materials, and additional or reduced cost CEUs. Administrative pressure or

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encouragement (n=3, 3%) represented a low percentage of respondents. Additionally,

respondents felt that workshops should be better advertised, more convenient, more

frequent, and provided at a lower cost to teachers.
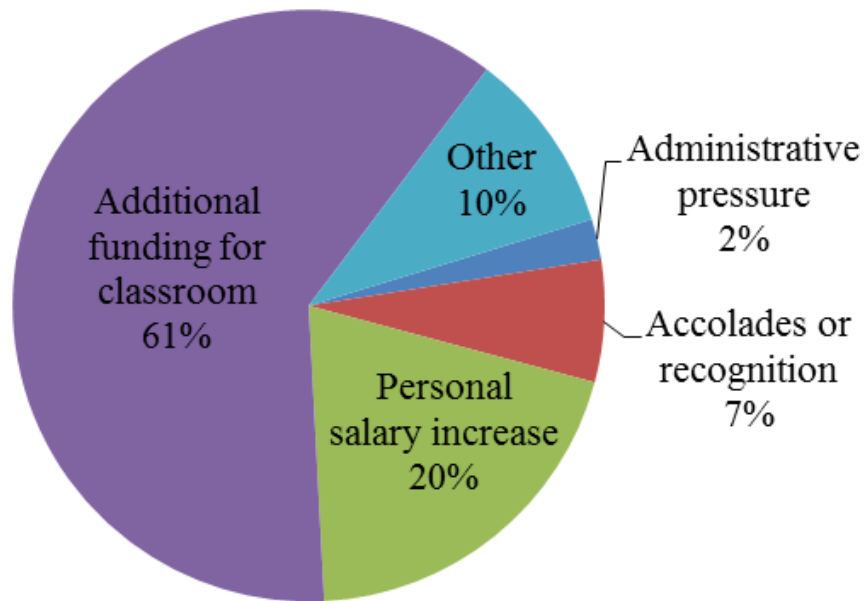
Figure 4.5   Best practices for encouraging more Mississippi teachers to attend
                     environmental education workshops

Notes: Best practices for encouraging more Mississippi teachers to attend environmental
education workshops, such as Project Learning Tree (PLT), as identified by Mississippi PLT
trained teachers (N=90) as reported in a 2014 PLT participant survey.
Teachers were trained in PLT from 2009-2013.

Similar results were discovered regarding the best way to encourage more

teachers to incorporate EE topics and lessons into their curricula (4.6). The majority

felt that monetary compensation (n=67, 74%) would provide the best incentive.

Providing additional funding to schools that included EE-based topics was selected most

frequently (n=49, 54%). Non-monetary incentives identified included having resources

and guidance provided for these types of lessons, being allowed time to plan, and having

EE integrated into state curricula. It was also identified that connecting existing PLT

lessons to Common Core State Standards would promote inclusion of PLT lessons. One

respondent did feel that we should not encourage incorporation of EE topics within

traditional schools.
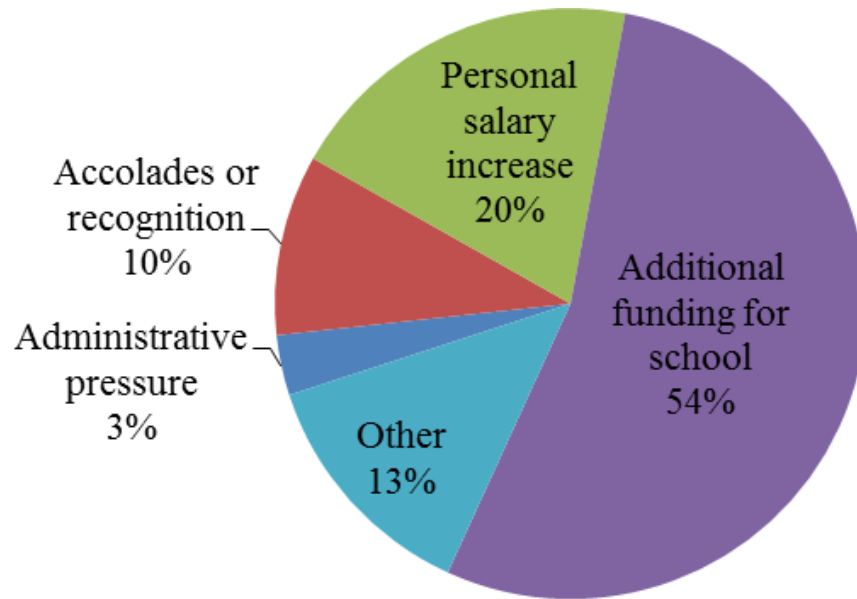
Figure 4.6   Best practices for encouraging more Mississippi teachers to incorporate
               environmental topics into their curricula

Notes: Best practices for encouraging more Mississippi teachers to incorporate environmental
topics into their curricula, as identified by Mississippi Project Learning Tree (PLT) trained
teachers (N=91) as reported in a 2014 PLT participant survey.
Teachers were trained in PLT from 2009-2013.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Discussion

Individuals who have completed Mississippi PLT workshops from 2009-2013 were surveyed to determine their environmental awareness, PLT workshop knowledge, classroom implementation of PLT curriculum, and barriers and motivations to implementation of PLT in traditional classrooms. Participants were surveyed using a web-based survey method. They were contacted through e-mail addresses provided for PLT workshop participant surveys. A total of 2,450 individuals were contacted, 129 individuals returned at least partial surveys, and 89 individuals returned completed surveys. Data were analyzed using IBM SPSS using descriptive and inferential statistics. Statistical measures included frequencies, means, t-tests, independent samples t-tests, and ANOVA.

The study results expand on the research and a growing body of literature exploring the use of EE in traditional classroom settings. Furthermore, this research provides novel information on the usage of PLT lessons in traditional classrooms in Mississippi. This research is also the first study, in Mississippi, to address the environmental awareness of PLT trained teachers. My literature review indicated no similar study in other states. At this time, PLT has been evaluated in only two other states (Maine and New Hampshire). Data obtained through this study provides insights

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into strengths and weakness of the Mississippi PLT program, as well as an understanding of motivations and challenges in implementing PLT curricula. This project establishes a baseline for future research on the implementing of PLT in classrooms, improving PLT workshops, and for further exploring motivations of PLT participants across the state.

This study focused on Mississippi teachers who had attended a PLT continuing education workshop. There were several limitations to this study. While the target population included all participants in PLT workshops from 2009-2013, which included some non-teachers, it was the goal to identify usage of PLT curriculum by Mississippi teachers. Additionally, it should be noted that not all PLT workshops provided the same experience to every participant. This study population was limited to a specific group of individuals and, therefore, study results cannot be extended outside of the population parameters. Furthermore, due to the low response rate, all findings can only be applied to this sub-population of Mississippi teachers. This study relied on self-reported behaviors and, therefore, may have response bias because of an over reporting on the use of PLT lessons. Respondents may not have selected their true motivations, but rather what they believed the researcher would want to see selected.

This study provided insights into the incorporation of EE in traditional schooling. Educators continue to strive to incorporate EE in current curricula, knowing that it provides positive benefits to those who participate and to society. These benefits include connecting people and nature, providing a foundational knowledge for future environmental issues, providing hands-on skills, creating environmental stewardship, building communities, and ideally creating solutions to current environmental issues (American Forest Foundation, 2014). Learning about the environment has the ability to

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promote children's intellectual, emotional, and physical growth by allowing them to get outside the classroom, explore the real world, and make connections between themselves and the world around them (Brannan et al., 2000; Taylor et al., 2001; Wells, 2000).

It is not the goal of EE to teach students what to think, but rather how to think, and specifically how to think about natural resources (American Forest Foundation, 2012). Allowing students to participate in EE may create an enthusiasm for learning among students by offering hands-on and relevant learning (Edelson, 2007). Students that are disconnected in traditional coursework are often successfully engaged using EE (Edelson, 2007). Research has shown that students with an attention-deficit disorder (ADD) benefit from the exposure to nature and "greenspaces" (Taylor et al., 2001). Additionally, students that suffer from self-control and self-discipline issues in traditional classrooms, not only are better able to manage their symptoms but will often excel in outdoor learning environments (Taylor et al., 2001). Students are being taught both environmental material, as well as critical thinking and relationship skills that cross into all areas of the curriculum and learning. Students that are exposed to natural environments have increased focus and improved cognition throughout the day (Wells, 2000).

A total of 129 individuals submitted at least a partially completed survey and, of these, 89 completed the survey in its entirety. Participants who were eligible for skip and display logics were not counted as incomplete as long as they completed the applicable questions displayed to them. This resulted in 6.72% adjusted response rate, including partial surveys, and a 4.64% adjusted response rate for completed surveys only.

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The response rate for this study was low; however, it was not unexpected. In both pilot studies, response rates were low at 0% and 6.25%, respectively. Response rates in web-based research relating to teachers tend to be lower. Web-based survey methods studying teachers have average response rates around 26%-27% (Danhauer et al., 2011; Fraze et al., 2003; Vorbeck et al., 2014). However, lower response rates when using these methods (web-based surveys) to research teachers are not uncommon. In a 2003 study comparing patterns of response of in-service teachers, a web-based survey obtained a response rate of 11% (Mertler, 2003). Another study comparing postal and web-based methods of surveying, researchers achieved a 0.75% response rate from a web-based survey of elementary classroom teachers (Resnick, 2012).

Response rates varied between questions. Some variation can be attributed to skip and display logic used in the Qualtrics® Survey Software. These logics are set to help reduce the number participants answering questions which do not apply to them personally. For example, if a participant stated that they do not implement PLT lessons into their classroom they would then skip all questions relating to implementation of PLT and are directed to a question referring to challenges related to implementation. Logics mitigate participants' frustration from having to answer extraneous questions. Additional variation occurred due to participants electing not to answer particular survey questions. When exporting Qualtrics® Survey data I chose to code these values as "-99," meaning that participants saw the question but chose not to respond. A majority of survey questions had at least one "-99" response. There appeared to be no pattern among which questions respondents selected to answer and which they chose to not respond. Percentages of completion ranged from 99.2% (NEP Scale) to 58.1% (school district of

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employment) (N=129) when accounting for questions not visible to all survey respondents (i.e. skip and display logic). Sample sizes have differ across questions to reflect these variations.

Due to time and fiscal limitations, I was unable to contact nonrespondents and assess the low response rate. Other research has identified common reasons for nonresponse among teachers. These include a lack of time, technological issues, perceived survey length, and accidental deletion (Mertler, 2003). I believe that some of these reasons may have attributed to my reduced response rate. For example, despite the skip and display logic, the survey may have been too lengthy, thus causing some potential participants to opt out of the survey process, although no evidence was found to support this notion. Additionally, many of the possible respondents were students at the time of completing the PLT workshop and may have felt the survey did not cover their area of expertise or that they were not qualified to provide feedback.

I examined the overall environmental awareness of teachers who have completed the PLT workshop in Mississippi. The NEP Scale was selected to serve as a proxy for an environmental awareness score in the study. I scored the NEP Scale at 15-75 with a neutral point of 45. I selected 45 as a transition point of an ecocentric worldview. In this study, respondents averaged NEP scores of 50.69. The score represents a higher than average ecocentric or pro-environmental worldview as defined by 45. Many teachers who participate in Mississippi PLT workshops seek out this opportunity. Being so, Mississippi trained teachers should have above average NEP scores. Mississippi PLT trained teachers, who responded to this survey, have NEP scores that represent average to high environmental awareness upholding this view.

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The mean NEP score was then compared among motivations for attending PLT workshops. Statistical differences were found between three motivations which included those who wanted to integrate more EE into their lesson plans and classroom lectures, encourage their students to connect to nature, and incorporate more science/STEM into their lesson plans and classroom lectures. For each of these motivations individuals selecting that motivation had a significantly higher mean NEP scores than those not selecting that motivation. I determined that motivation for attending PLT workshops does have a moderate relationship to mean NEP score.

The amount of information retained from attended PLT workshops was assessed, as well as the amount of PLT materials incorporated into teachers' classrooms. Mississippi PLT trained teachers who responded to this survey seemed to recall the majority of information provided at PLT workshops and they implemented PLT materials into their classrooms. Respondents scores on the knowledge portion of the survey ($\bar{x}$=6.17) were significantly higher than five correct answers. Respondents appeared able to remember knowledge taught during PLT workshops and were able to recall this knowledge when asked. Additionally, the majority of respondents included PLT materials into their classroom instruction. Seventy-five percent stated that they had incorporated at least one lesson from acquired PLT materials.

Major subject teaching areas did not appear to have any effect on the mean number of PLT lessons incorporated into classroom teaching. Teachers across all subject areas appeared to incorporate PLT lessons evenly into their classrooms. Four motivations for incorporating PLT lessons were identified as significant. It appeared that teachers whom were motivated by providing hands-on experiences for their students,

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meeting common core/state standards, getting student outside of the classroom and into the outdoors, and having current lessons that complimented PLT lessons, incorporated more lessons than those not motivated by these areas.

   This study examined the gaps that exist between providing information at PLT workshops and the incorporation of that information into traditional classrooms. Time was found to be a major limitation when implementing PLT lessons into traditional classrooms. Many respondents felt that they did not have enough time to implement these activities. Time limitations may have been a key issue in not filling out the survey itself. Since In general, since time could have been a factor in the response rate to the survey, it would be logical that time would be an issue in this case. In a national survey of 20,157 PreK–12 public school classroom teachers identified constantly changing demands and lack of time as the most significant challenges of teaching (Bill and Melinda Gates Foundation, 2014). Teachers in this study also saw a lack of time as a factor limiting their ability to include PLT materials. Teachers' time is very valuable and is often divided into multiple job-related tasks including teaching, grading, developing lesson plans, among other tasks (Krantz-Kent, 2008). Additionally teachers in the United States, on average, currently work 53 hours per week (Bill and Melinda Gates Foundation, 2013). An average teacher will spend 7.5 hours in the classroom, 90 minutes after the school day providing services to students, and 95 minutes once at home for grading and preparing additional school materials per day (Strauss, 2014). Easton and Monroe found that a majority of Florida PLT trained teachers not implementing the PLT program into their classrooms stated that they "did not have enough time to plan and teach PLT" (2002). In this same study, not teaching a relevant subject and lack of

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correlation to state standards were additional challenges to implementation that teachers faced (Easton and Monroe, 2002).

The second most addressed challenge to implementation was the lack of connection between PLT and current curricula. Respondents also noted that they had forgotten information about the PLT lessons, which would require an additional time commitment to review potential course materials. This led them to feel uncomfortable with using provided PLT materials in their own classrooms. Additional exposure to PLT lessons would allow teachers to become more familiar and comfortable with the material.

Monetary compensation was identified by respondents as the best incentive to encourage an increase in attendance at PLT workshops and encourage implementation of additional PLT lessons. Providing additional funding for schools or individual classrooms was favored over personal salary increases. Administrative pressure or encouragement was not identified as a highly motivating factor.

Respondents felt there needed to be better advertisement of locations and times offered to attend workshops. They indicated that PLT workshops should be made more convenient, more frequent, and provided at a lower cost to teachers. Currently, the fee to attend a Mississippi PLT workshop is $15.00. This fee covers the cost of the PLT Environmental Education Activity Guide, additional handout materials, and light refreshments during the workshop. In Mississippi, PLT workshops are also incorporated into a weeklong Mississippi Teacher Conservation Workshop (MTCW). MTCW charges a fee of $100 to attend, however, this amount is refunded at the conclusion of the workshop to participants that completing all requirements. These fees do not include teacher travel to and from the workshop, lodging or food costs. PLT workshops are

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presented as a one-day workshop; however, there may be teachers that must travel to attend them. Providing assistance to teachers traveling for workshops may help mitigate the perceived cost of attending. Respondents felt that additional guidance providing for PLT lessons, being allowed time to plan, and having EE integrated into state curricula would encourage additional usage of PLT in classrooms.

Recommendations

There are a series of recommendations that can be implemented based on the findings of this study. Environmentally-based professional development workshops, such as PLT, need to become more useful, gratifying, and accessible to teachers. Additionally, professional relationships must be developed between workshop facilitators and teachers. To encourage attendance of environmental-based professional development workshops teachers must see the value in these programs for both themselves and their students. Professional development workshops take time to attend and often are viewed as a necessity and not something that is intrinsically enjoyable. The majority of teachers in this study attended PLT because they were offered credit for their participation.

Incorporation of PLT and other environmentally-based programs should be done at the preservice teacher level. Incorporation of these topics during teacher training eliminates the time strain felt by the majority of teachers once in-service. Incorporation at the preservice level all so ensures that all new teachers will have at least a basic understanding of EE and environmental issues. Environmental topics represent a very relevant and important area of current events. It is critical that teachers are provided with at least basic understanding in their preservice education within the area of EE.

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Having these programs incorporated at the preservice level would also increase accessibility. College and university campuses could allow for easy advertisement of upcoming programs for both students and teachers. Currently, workshops are more prominently advertised by word of mouth, this consequently can exclude some teachers from attending PLT workshops. Regardless of a teacher's position, to encourage attendance there must be increased advertisement of PLT workshops and location.

To encourage the usage of PLT materials it is critical that teachers see the benefit to them and their classrooms. The "Environmental Education Activity Guidebook" was provided to every PLT trained teacher and includes multiple lessons, which are easily linked to many subject areas. PLT facilitators must enforce EE's interdisciplinary nature. The myth that EE must only be taught in science classes must be overcome to promote effective incorporation of PLT across all subject areas. Teachers must be made aware of these connections and the true time it takes to incorporate PLT lessons. A majority of PLT lessons provide all materials a teacher would need to successfully complete the lesson, requiring little to no additional preparation time expenditure for the teacher compared to a typical lesson.

It is recommended that a professional working relationship is established between workshop facilitators and teachers desiring to use these materials. Ideally, workshop facilitators should make themselves available to teachers after completing training to serve a supportive role. A majority of workshop facilitators volunteer to serve as PLT trainers because of the lack of full-time PLT facilitators, this professional relationship has been greatly underutilized. The creation of full-time PLT facilitator positions is needed to fully develop this relationship between facilitators and teachers. However, this may

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increase the cost of PLT workshops. Ideally, corporate support or other donations could supplement grants to enable this action.

Unfamiliarity with the subject material may serve as a limitation for some teachers, and providing continued support might help to overcome this obstacle. Lacking familiarity with a subject can make a teacher anxious teaching that material or it may limit usage of related materials (Walker, 2012). It is estimated that less than 15% of science teachers have been formally trained in EE and there are limited preservice and in-service opportunities for teachers to become trained in the area of EE (Ramsey and Hungerford, 2002). PLT represents a unique opportunity for both preservice and in-service teachers.

Mississippi adopted the Common Core State Standards (CCSS) in June 2010 with full establishment in the 2013/2014 school year. Mississippi teachers are likely still learning and adjusting to the CCSS. This survey took place during this transitional time and this may explain the lack of a perceived connection between the curriculum and PLT lessons. Educational reforms have been identified as a critical limitation to using PLT materials in traditional classrooms (Easton and Monroe, 2002). It is important that PLT workshop coordinators explain how PLT fits into CCSS, as well as how teachers can find this information on their own. The Mississippi PLT Correlations for Science, Math and Language Arts and alignments to CCSS are available currently on the national PLT website (www.plt.org). PLT curriculum guide books are easy to align to the new standards once there is an understanding of how the book is organized. PLT workshop facilitators should familiarize themselves with these alignments and be prepared to provide support for teachers attending workshops. Additionally, PLT Activity Guides

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should be fully aligned to CCSS and these alignments should be printed in the "Environmental Education Activity Guidebook" itself. The current "Environmental Education Activity Guidebook" can be easily connected to individual standards; however, this requires great familiarity with CCSS and the guide itself.

The Mississippi PLT program should establish an electronic database of all individuals trained in PLT. Electronic documents provide a secure and cost efficient means of record keeping. Such a database, would also allow for searchable and easily accessed files on all PLT trained individuals. Being able to easily access files would allow for quick and efficient follow-up after completing workshops. Electronic systems could allow PLT facilitators to continue contacting teachers they trained and provide targeted support to individuals who need help, developing a stronger relationship between the teacher and PLT facilitators. This system would also provide teachers with a list of PLT trained individuals whom they could interact and connect with to form a support system, helping to mitigate unfamiliarity with the PLT curriculum. For research, having this database could more easily facilitate additional investigation on issues discussed or suggested for further inquiry.

At the national level, PLT recognizes "Educations of the Year". This form of acknowledgment should be implemented at the state level. In this study, teachers identified accolades and recognition as a highly motivating incentive for both attending PLT workshops and implementing PLT materials into their classrooms. While there are a multiple number of small prizes given away during the majority of Mississippi PLT workshops, there should be recognition for teachers implementing the PLT curriculum into their classrooms. This would provide teachers with a more formal, widespread

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recognition. Teachers who are able to provide proof of using PLT should receive some form of acknowledgement for their effort. Providing some type of additional incentive to those teachers implementing PLT, may help to increase the widespread usage of these materials. Implementing a "Mississippi PLT Teacher of the Year" program would provide an incentive for teachers implementing PLT.

Areas for Future Study

A follow-up study employing alternative survey method would be able to provide additional information on the actual usage and views of the PLT program by Mississippi teachers. Following an initial e-mail to a web-based method of surveying, contacting a random sample of respondents for a follow-up study would allow for a greater depth of information to be obtained. Using phones, focus groups, or in-person survey approaches could elicit important qualitative data and provide greater insights into the motivations, attitudes, and behaviors of Mississippi PLT trained teachers.

Repeating this study using teacher logged lesson plans would provide a more realistic view on the actual usage of PLT lessons. A qualitative review of teacher lesson plans could provide a complete picture of the usage of PLT in Mississippi schools. Analysis of such a study could provide data on which PLT lessons are being integrated into the classroom, as well as, how they are being integrated.

A longitudinal study of the usage of PLT materials in traditional classrooms would provide a more complete portrait of teacher behaviors. Studying the differences in usage of PLT over time would allow for more efficient PLT training. Such a study could provide data to evaluate the need for occasional "refresher" PLT training sessions. There is a potential that these could be done online as webinars, thus lowering follow-up costs.

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Longitudinal data would provide information on the benefit of additional training and when "refresher" training would be most useful.

Finally, many possible environmental and economic benefits may be derived from participation in EE programing. Research should be conducted to assess positive economic gains and other benefits of participation in EE programing. This type of investigation would be one way to encourage additional widespread participation by schools and other organizations in environmental programs. There is a need for future research that links environmental and economic benefits with EE programs. There has been nonmarket valuation techniques used to price many goods and services derived from physical health, academic gains, and environmental improvements. What is needed currently is research that is able to connect the impact of EE on these areas. Having a total economic value of EE programs may increase administrator and stakeholder buy in, helping to increase funding and access to EE for teachers.

Conclusions

Hungerford and Volk (1990) stated that "the ultimate aim of education is shaping human behavior." The traditional assumption made about EE is that, by educating individuals, they become them more knowledgeable, and they will then become more aware of the environment and begin to act in an environmentally responsible way. However, in practice, thinking traditionally is much too simplistic. Research has shown, that with enough of the right type of EE, behavior development and change can occur (Hungerford and Volk, 1990). For behavioral changes or development to occur, we must educate in such a way that provides the student with not only topical knowledge but also a sense of ownership and belonging.

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PLT provides educators with environmental-based lessons that can be used across all disciplines in a traditional school setting. It is critical that these materials are made available to teachers and support exists throughout their teaching career to ensure that materials are not only incorporated, but also done by following best practices for teaching EE. EE programming is most often viewed, by teachers, as something extra in which they must find time to implement into their classroom teaching (Ernst, 2009). However, EE should not be in competition with core subject areas but rather incorporated seamlessly within these topics. There exists a discrepancy in the philosophy of EE and the reality of practice within traditional classrooms (Ernst, 2009). When EE is taught with the end goal of behavioral change in mind, knowledge has the ability to transform behavior (Redman, 2013). These pro-environmental behaviors have the ability to improve our utilization, conservation, and preservation of natural resources. Improvements made to wildlife habitat, clean water, clean air, runoff reduction, general pollution reduction, creation of recreation opportunities, mitigation of effects of environmental changes on threatened and endangered species, and improved aesthetics are just a few of the possible natural resource improvements possible. Additionally learning about the environment has the ability to promote children's intellectual, emotional, and physical growth by allowing them to get outside the classroom, explore the natural world, and make connections between themselves and the world around them.

The current state of curriculum and education reforms in the United States pushes towards educating children and youth through providing cross-curricular and interdisciplinary learning opportunities. Students are encouraged to explore and investigate topic areas independently to create their own learning experience. EE,

through natural resource, provides an appropriate process of promoting and implementing these educational reforms. In states, such as Mississippi, which have historically underperformed in their ability to provide quality education to primary and secondary students, EE provides an easily attainable, low cost option for meeting current educational standards, while educating teachers and students on the natural resources of which a large part of the economy and quality of life depend.

Natural resource professionals must be involved in the process of bringing EE into traditional schools and preparing the next generation for the environmental challenges that they will inherit. Natural resource professionals have the in-depth content knowledge that is needed for successful EE programing, while teachers understand the pedagogical knowledge of education. These professions must combine their independent expertise, knowledge, and unique views to create EE programs that will empower students. Over time, the natural resources field has become more inclusive of issues related to diversity, sustainability, social sciences, and human interactions with the environment (Green, 2006). To continue successfully as a vocation, EE is a critical area the profession must embrace.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD (IRB) APPROVED LETTERS FOR PILOT

STUDY

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First Contact: Introduction

Good Morning,

       My name is Kimberly Carroll and I am a Master's student at Mississippi State University in the Department of Forestry. I am conducting a pilot-survey on environmental education awareness among Mississippi teachers. Obtaining feedback from teachers whom have completed environmental education based workshops is critical to the completion of this research.

       Your opinion is very important in understanding what teachers gain from participation in conservation workshops, as well as how conservation workshops can be tailored to benefit teachers. Completion of this survey should take approximately 15 minutes. I would invite you to please take some time and complete the survey, which can be accessed at the link below.

       Your participation in this survey is completely voluntary and survey responses will remain confidential. No individual will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294. I thank you for your time in completion of this survey.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

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Second Contact: Follow-up

Good Morning,

      This is a repeat e-mail from the message sent two weeks ago and a reminder to complete the teacher environmental education workshop pilot- survey. Obtaining feedback from teachers whom have completed environmental education based workshops is critical to the completion of this research.

      Your opinion is very important in understanding what teachers gain from participation in conservation workshops, as well as, how conservation workshops can be tailored to benefit teachers. Completion of the survey should take approximately 15 minutes. I would invite you to please take some time and complete the survey, which can be accessed at the link below.

      Your participation in this survey is completely voluntary and surveys will be confidential. No individual responses will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294.

      If you have already completed the survey, I would like to thank you. If you have not completed the survey, I would like to ask you to please do so at your earliest convenience.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

Third Contact: Thank you

Good Morning,

Thank you for your participation in this research.   Your feedback is extremely valuable to my project and understanding what motivates teachers to completed environmental education workshops. I would like to remind you that your survey responses are confidential and no individual will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294. I thank you for your time in completion of this survey.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

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APPENDIX B

INSTITUTIONAL REVIEW BOARD (IRB) APPROVED LETERS FOR

DISTROBUTION OF STUDY

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First Contact: Introduction

Good Morning,

       My name is Kimberly Carroll and I am a Master's student at Mississippi State University in the Department of Forestry. I am conducting a survey on environmental education awareness among Mississippi teachers. Obtaining feedback from teachers whom have completed environmental education based workshops is critical to the completion of this research.

       Your opinion is very important in understanding what teachers gain from participation in conservation workshops, as well as how conservation workshops can be tailored to benefit teachers. Completion of this survey should take approximately 15 minutes. I would invite you to please take some time and complete the survey, which can be accessed at the link below.

       Your participation in this survey is completely voluntary and survey responses will be confidential. No individual will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294. I thank you for your time in completion of this survey.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

Second Contact: Follow-up

Good Morning,

This is a repeat e-mail from the message sent two weeks ago and a reminder to complete the teacher environmental education workshop survey. Obtaining feedback from teachers whom have completed environmental education based workshops is critical to the completion of this research.

Your opinion is very important in understanding what teachers gain from participation in conservation workshops, as well as, how conservation workshops can be tailored to benefit teachers. Completion of the survey should take approximately 15 minutes. I would invite you to please take some time and complete the survey, which can be accessed at the link below.

Your participation in this survey is completely voluntary and surveys will be confidential. No individual responses will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294.

If you have already completed the survey, I would like to thank you. If you have not completed the survey, I would like to ask you to please do so at your earliest convenience.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

Third Contact: Follow-up

Good Morning,

This is a repeat e-mail from the message sent two weeks ago and a reminder to complete the teacher environmental education workshop survey. This will be the final reminder sent pertaining to the survey. Obtaining feedback from teachers whom have completed environmental based workshops is critical to the completion of this research.

Your opinion is very important in understanding what teachers gain from participation in conservation workshops, as well as, how conservation workshops can be tailored to benefit teachers. Completion of the survey should take approximately 15 minutes. I would invite you to please take some time and complete the survey, which can be accessed at the link below.

Your participation in this survey is completely voluntary and surveys will be confidential. No individual responses will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294.

If you have already completed the survey, I would like to thank you. If you have not completed the survey, I would like to ask you to please do so at your earliest convenience.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

Fourth Contact: Follow-up

Good Morning,

      This is a repeat e-mail from the message sent two weeks ago and a reminder to complete the teacher environmental education workshop survey.   This will be the final reminder sent pertaining to the survey. Obtaining feedback from teachers whom have completed environmental based workshops is critical to the completion of this research.
      Your opinion is very important in understanding what teachers gain from participation in conservation workshops, as well as, how conservation workshops can be tailored to benefit teachers. Completion of the survey should take approximately 15 minutes. I would invite you to please take some time and complete the survey, which can be accessed at the link below.

      Your participation in this survey is completely voluntary and surveys will be confidential. No individual responses will be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294.
      If you have already completed the survey, I would like to thank you. If you have not completed the survey, I would like to ask you to please do so at your earliest convenience.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

Fifth Contact: Thank You

Good Morning,

       Thank you for your participation in this research.   Your feedback is extremely valuable to my project and understanding what motivates teachers to completed environmental education workshops. I would like to remind you that your survey responses are confidential and no individual can be identified through the analysis of the returned surveys. If you have any concerns about this study, please do not hesitate to contact me at kcarroll@cfr.msstate.edu. If you have additional questions concerning rights as a research participate, you may contact the Office of Research Compliance of Mississippi State University at 662-325-3294. I thank you for your time in completion of this survey.

Thank you.
Kimberly Carroll
Graduate Teaching Assistant

APPENDIX C

MISSISSIPPI PROJECT LEARNING TREE TEACHER SURVEY

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Q1 Select the level to which you agree or disagree with each statement.

	Strongly Agree (1)	Agree (2)	Neither Agree nor Disagree (3)	Disagree (4)	Strongly Disagree (5)
We are approaching the limit of the number of people the Earth can support (1)	○	○	○	○	○
Humans have the right to modify the natural environment to suit their needs (2)	○	○	○	○	○
When humans interfere with nature, it often produces disastrous consequences (3)	○	○	○	○	○
Human ingenuity will insure that we do not make the Earth unlivable (4)	○	○	○	○	○
Humans are severely abusing the Earth (5)	○	○	○	○	○
The Earth has plenty of natural resources if we just learn how to develop them. (6)	○	○	○	○	○
Plants and animals have as much right as humans to exist (7)	○	○	○	○	○
The balance of nature is strong enough to cope with the impacts of modern industrial nations (8)	○	○	○	○	○
Despite our special abilities, humans are still subject to the laws of nature (9)	○	○	○	○	○

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The so-called "ecological crisis" facing humankind has been greatly exaggerated (10)	○	○	○	○	○
The Earth is like a spaceship with very limited space and resources. (11)	○	○	○	○	○
Humans were meant to rule over the rest of nature (12)	○	○	○	○	○
The balance of nature is very delicate and easily upset (13)	○	○	○	○	○
Humans will eventually learn enough about how nature works to be able to control it (14)	○	○	○	○	○
If things continue on their present course, we will soon experience a major environmental catastrophe (15)	○	○	○	○	○

Q2 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

Q3 The following questions are based on lessons most commonly presented at Project Learning Tree Workshops. Please answer without the help of outside materials.

Q4 Which of the following below is an example of point-source pollution?
○ Outflow pipe of a factory (1)
○ Pesticide from a field (2)
○ Oil runoff from a parking lot (3)

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Q5 Approximately what fraction of the Earth is covered in water?

○ 3/4 (1)

○ 1/2 (2)

○ 5/8 (3)

Q6 Which is not part of a tree's trunk?

○ Heartwood (1)

○ Xylem (2)

○ Stomata (3)

Q7 What is the function of xylem in a tree?

○ Carries water and nutrients up from the roots to the leaves (1)

○ Provides strength and support for the tree (2)

○ Carries water and the sugar made in the leaves down to other parts of the tree (3)

Q8 What is the function of cambium in a tree?

○ Carries water and nutrients up from the roots to the leaves (1)

○ Carries water and the sugar made in the leaves down to other parts of the tree (2)

○ Growing layer of tree creating new xylem, phloem or cambium (3)

Q9 Which is not a function of a tree's roots?

○ Help anchor the tree into the ground (1)

○ Absorb water and nutrients from soil (2)

○ Produce oxygen and sugar (3)

Q10 Public and private forest cover nearly _____ of our nation's land.

○ 1/3 (1)

○ 1/6 (2)

○ 1/2 (3)

Q11 The Multiple Use and Sustained Yield Act of 1960 required that National Forests must be managed how?

○ In a manner to provide the maximum benefit for the general public (1)

○ In a manner to provide the maximum economic benefit regardless of who is the recipient (2)

○ In a manner to provide the best habitat for fish and wildlife species (3)

Q12 What is habitat fragmentation?

❍ The process of dividing large, continuous ecosystems and habitats into smaller, isolated parcels (1)

❍ The natural process of ecosystems and habitats evolving and changing (2)

❍ The process of combining small, isolated ecosystems and habitats into larger, continuous ecosystems and habitats (3)

Q13 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

Q14 The following questions will ask you about the importance and use of Project Learning Tree Materials within your classroom.

Q15 Select level of importance

	Extremely Important (1)	Very Important (2)	Neither Important nor Unimportant (3)	Very Unimportant (4)	Not at all Important (5)	Unsure (6)
How important is it that you encourage the care of the environment in your classroom? (1)	❍	❍	❍	❍	❍	❍
How important is it that you build environmental topics into your curriculum? (2)	❍	❍	❍	❍	❍	❍

Q16 Have you incorporated at least one Project Learning Tree lesson or activity in your classroom teaching?
- ❍ Yes (1)
- ❍ No (2)
- ❍ Not sure (3)

Q17 Have you incorporated Project Learning Tree lessons and activities in your teaching that you did not learn in the workshop(s) you attended?
- ❍ Yes (1)
- ❍ No (2)
- ❍ Not Sure (3)

Q18 Which Project Learning Tree topics did you incorporate into your classroom most often?
- ❍ Diversity (1)
- ❍ Interrelationships (2)
- ❍ System (3)
- ❍ Structure and scale (4)
- ❍ Patterns of change (5)
- ❍ Use all topic areas evenly (6)

Q19 Which Project Learning Tree lessons or activities did you incorporate into your lessons specifically? (Provide the lesson number or name.)

Q20 Why were these activities/this activity chosen for incorporation into your teaching? Choose all that apply.
- ❑ Fit into existing curriculum (1)
- ❑ Lesson was taught during Project Learning Tree workshop (2)
- ❑ Different experience for the student (3)
- ❑ Easily incorporated into classroom (4)
- ❑ Materials were available (5)
- ❑ Other (6) _____

Q21 How many different lessons from the Environmental Education Activity Guide (provided at the completion of Project Learning Tree Workshop) do you incorporate into your teaching in a school year?
- ❍ 0-5 lessons per year (1)
- ❍ 6-10 lessons per year (2)
- ❍ 11-15 lessons per year (3)
- ❍ Greater than 15 lessons per year (4)

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Q22 Why do you incorporate Project Learning Tree into your curriculum? Select all that apply.
- ❑ Provide hands-on experience (1)
- ❑ Raise awareness of environmental issues (2)
- ❑ Meet common core/state standards (3)
- ❑ Substitute for other lesson plans (4)
- ❑ Get students outside of the classroom (5)
- ❑ Compliments existing lessons (6)
- ❑ Other (please specify) (7) _____

Q23 What do you feel is the greatest challenge to implementing Project Learning Tree lessons into your teaching?
- ❍ I do not feel comfortable with the lessons (1)
- ❍ It does not fit into my current curriculum (2)
- ❍ I do not have the time (3)
- ❍ I do not remember the activities (4)
- ❍ I have tried, but my students did not enjoy it (5)
- ❍ Other (please specify) (6) _____

Q24 Do you implement other environmental education curriculum guides into your teaching?
- ❍ Yes (1)
- ❍ No (2)
- ❍ Not sure (3)

Q25 Specify which environmental education curriculum guides you use.

Q26 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

Q27 The following questions relate to personal reasons for attending Project Learning Tree Workshops and incentives to encourage teacher participation.

Q28 Why did you decide to take part in a Project Learning Tree workshop? Select all that apply.
- ❑ Recommendation from colleague/administrator (1)
- ❑ Participated in past professional development programs and was interested in other programs (2)
- ❑ Offered credit for participating in workshop [i.e., Continuing Education Units (CEUs); college credits] (3)
- ❑ Wanted to be more knowledgeable on forest practices and natural resource information (4)
- ❑ Wanted to integrate more environmental education into my lesson plans and classroom lectures (5)
- ❑ Wanted to be able to teach forestry and natural resources to students (6)
- ❑ Wanted to encourage my students to connect to nature (7)
- ❑ Wanted to incorporate more science/STEM into my lesson plans and classroom lectures (8)
- ❑ Other (please specify) (9) _____

Q29 What was your favorite aspect of the Project Learning Tree Workshop?
- ❍ Environmental Education Activity Guidebook (1)
- ❍ Having interactions with other teachers (i.e., social aspects) (2)
- ❍ Gaining new ideas for your classroom (3)
- ❍ Learning how to incorporate lessons into the classroom or grade level (4)
- ❍ Other (please specify) (5) _____

Q30 What do you believe to be the best way to encourage more teachers to participate in environmental education workshops?
- ❍ Administrative pressure (1)
- ❍ Accolades or recognition (2)
- ❍ Personal salary increases (3)
- ❍ Additional funding for your classroom (4)
- ❍ Other (please specify) (5) _____

Q31 What do you believe to be the best way to encourage more teachers to build environmental topics into their curriculum?
- ❍ Administrative pressure (1)
- ❍ Accolades or recognition (2)
- ❍ Personal salary increase (3)
- ❍ Additional funding for school (4)
- ❍ Other (please specify) (5) _____

Q32 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

Q33 The following questions related to your participation in Project Learning Tree Workshops.

Q34 What year(s) did you participate in the Project Learning Tree Workshop? Use Ctrl to select multiple, if needed.
- ❑ 2014 (1)
- ❑ 2013 (2)
- ❑ 2012 (3)
- ❑ 2011 (4)
- ❑ 2010 (5)
- ❑ 2009 (6)
- ❑ 2008 (7)
- ❑ 2007 (8)
- ❑ 2006 (9)
- ❑ 2005 (10)
- ❑ 2004 (11)
- ❑ 2003 (12)
- ❑ 2002 (13)
- ❑ 2001 (14)
- ❑ 2000 (15)

Q35 Select the types of Project Learning Tree programs you have participated in. Check all that apply.
- ❑ Secondary module (1)
- ❑ Traditional preK to 8th grade (2)
- ❑ Preservice preK to 8th grade (3)
- ❑ Project Learning Tree integrated into a week-long teacher institute (4)
- ❑ Other (please specify) (5) _____

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Q36 Which secondary module training sessions have you attended? Select all that apply.
- ❑ Biodiversity (1)
- ❑ Biotechnology (2)
- ❑ Focus on Forests (3)
- ❑ Forests of the World (4)
- ❑ Places We Live (5)
- ❑ Focus on Risk (6)
- ❑ Municipal Solid Waste (7)

Q37 Have you attended any additional conservation-based workshops (e.g., Project WET, Project WILD, Teacher Conservation Workshops)?
- ❍ Yes (1)
- ❍ No (2)

Q38 List name(s) of any previous conservation workshops you have attended.

Q39 When you participated in the Project Learning Tree Workshop were you a preservice teacher (i.e., a student who has not yet completed training to be a licensed teacher)?
- ❍ Yes (1)
- ❍ No (2)
- ❍ Not sure (3)

Q40 Do you feel that you will use Project Learning Tree Materials as a licensed teacher?
- ❍ Yes (4)
- ❍ No (6)
- ❍ Not sure (5)

Q41 Did you receive Continuing Education Units (CEUs) or other credits (including college credits) for attending the Project Learning Tree Workshop?
- ❍ Yes (1)
- ❍ No (2)
- ❍ Not Sure (3)

Q42 Select your gender
- ❍ Male (1)
- ❍ Female (2)
- ❍ Prefer not to answer (4)

Q43 Select your age range
- ❍ 20-29 (1)

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- ○ 30-39 (2)
- ○ 40-49 (3)
- ○ 50-59 (4)
- ○ 60-69 (5)
- ○ 70-79 (6)
- ○ 80-89 (7)
- ○ 90-99 (8)
- ○ Prefer not to answer (9)

Q44 Select the county that serves as your primary residence.
- ○ Adams (1)
- ○ Alcorn (2)
- ○ Amite (3)
- ○ Attala (4)
- ○ Benton (5)
- ○ Bolivar (6)
- ○ Calhoun (7)
- ○ Carroll (8)
- ○ Chickasaw (9)
- ○ Choctaw (10)
- ○ Claiborne (11)
- ○ Clarke (12)
- ○ Clay (13)
- ○ Coahoma (14)
- ○ Copiah (15)
- ○ Covington (16)
- ○ DeSoto (17)
- ○ Forrest (18)
- ○ Franklin (19)
- ○ George (20)
- ○ Greene (21)
- ○ Grenada (22)
- ○ Hancock (23)
- ○ Harrison (24)
- ○ Hinds (25)
- ○ Holmes (26)
- ○ Humphreys (27)
- ○ Issaquena (28)
- ○ Itawamba (29)
- ○ Jackson (30)
- ○ Jasper (31)
- ○ Jefferson (32)
- ○ Jefferson Davis (33)

- ❍ Jones (34)
- ❍ Kemper (35)
- ❍ Lafayette (36)
- ❍ Lamar (37)
- ❍ Lauderdale (38)
- ❍ Lawrence (39)
- ❍ Leake (40)
- ❍ Lee (41)
- ❍ Leflore (42)
- ❍ Lincoln (43)
- ❍ Lowndes (44)
- ❍ Madison (45)
- ❍ Marion (46)
- ❍ Marshall (47)
- ❍ Monroe (48)
- ❍ Montgomery (49)
- ❍ Neshoba (50)
- ❍ Newton (51)
- ❍ Noxubee (52)
- ❍ Oktibbeha (53)
- ❍ Panola (54)
- ❍ Pearl River (55)
- ❍ Perry (56)
- ❍ Pike (57)
- ❍ Pontotoc (58)
- ❍ Prentiss (59)
- ❍ Quitman (60)
- ❍ Rankin (61)
- ❍ Scott (62)
- ❍ Sharkey (63)
- ❍ Simpson (64)
- ❍ Smith (65)
- ❍ Stone (66)
- ❍ Sunflower (67)
- ❍ Tallahatchie (68)
- ❍ Tate (69)
- ❍ Tippah (70)
- ❍ Tishomingo (71)
- ❍ Tunica (72)
- ❍ Union (73)
- ❍ Walthall (74)
- ❍ Warren (75)
- ❍ Washington (76)

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○ Wayne (77)
○ Webster (78)
○ Wilkinson (79)
○ Winston (80)
○ Yalobusha (81)
○ Yazoo (82)
○ Prefer not to answer (83)
○ Nonresident (84)

Q45 Select your highest level of education
○ High School Graduate/ GED (1)
○ Associate Degree (2)
○ Bachelor's Degree (3)
○ Master's Degree (4)
○ Professional Degree (5)
○ Doctorate Degree (6)

Q46 Select your employment status
○ Employed (full-time) (1)
○ Employed (part-time) (2)
○ Out of work (looking/not looking) (3)
○ Student/ Preservice Teacher (4)
○ Retired (5)

Q47 Select school the district where are you employed. If not employed in public school, please Independent/ Private School.
○ Independent/Private School (156)
○ Nonformal/Nontraditional Educator (312)
○ Aberdeen School District (1)
○ Alcorn School District (2)
○ Amite County School District (3)
○ Amory School District (4)
○ Attala County School District (5)
○ Baldwyn Public School (6)
○ Bay St. Louis-Waveland School District (7)
○ Benoit School District (8)
○ Benton County School District (9)
○ Biloxi Public School District (10)
○ Booneville School District (11)
○ Brookhaven School District (12)
○ Calhoun County School District (13)
○ Canton Public School District (14)
○ Carroll County School District (15)

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- Chickasaw County School District (16)
- Choctaw County School District (17)
- Claiborne County School District (18)
- Clarksdale Municipal School District (19)
- Clay County School District (20)
- Cleveland School District (21)
- Clinton Public School District (22)
- Coahoma Agricultural High School (23)
- Coahoma County School District (24)
- Coffeeville School District (25)
- Columbia School District (26)
- Columbus Municipal School District (27)
- Copiah County School District (28)
- Corinth School District (29)
- Covington County School District (30)
- DeSoto County School District (31)
- Durant Public School District (32)
- East Jasper School District (33)
- East Tallahatchie School District (34)
- Enterprise School District (35)
- Forest Municipal School District (36)
- Forrest County AHS (37)
- Forrest County Schools (38)
- Franklin County School District (39)
- George County School District (40)
- Greene County School District (41)
- Greenville Public School District (42)
- Greenwood Public School District (43)
- Grenada School District (44)
- Gulfport School District (45)
- Hancock County School District (46)
- Harrison County School District (47)
- Hattiesburg Public School District (48)
- Hazlehurst City School District (49)
- Hinds County Agricultural High School (50)
- Hinds County School District (51)
- Hollandale School District (52)
- Holly Springs School District (53)
- Holmes County School District (54)
- Houston School District (55)
- Humphreys County School District (56)
- Indianola School District (57)
- Itawamba County School District (58)

- Jackson County School District (59)
- Jackson Public School District (60)
- Jefferson County School District (61)
- Jefferson Davis County School (62)
- Jones County School District (63)
- Kemper County School District (64)
- Kosciusko School District (65)
- Lafayette County Schools (66)
- Lamar County School District (67)
- Lauderdale County Schools (68)
- Laurel School District (69)
- Lawrence County School District (70)
- Leake County School District (71)
- Lee County Schools (72)
- Leflore County School District (73)
- Leland School District (74)
- Lincoln County School District (75)
- Long Beach School District (76)
- Louisville Municipal School District (77)
- Lowndes County School District (78)
- Lumberton Public School District (79)
- Madison County School District (80)
- Marion County School District (81)
- Marshall County School District (82)
- McComb School District (83)
- Meridian Public School District (84)
- Mississippi School for Mathematics & Science (85)
- Mississippi School for the Blind (86)
- Mississippi School for the Deaf (87)
- Mississippi School of the Arts (88)
- Monroe County School District (89)
- Montgomery County School District (90)
- Moss Point School District (91)
- Mound Bayou Public Schools (92)
- Natchez-Adams School District (93)
- Neshoba County School District (94)
- Nettleton School District (95)
- New Albany School District (96)
- Newton County Schools (97)
- Newton Municipal School District (98)
- North Bolivar School District (99)
- North Panola School District (100)
- North Pike Consolidated School District (101)

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- ❍ North Tippah School District (102)
- ❍ Noxubee County School District (103)
- ❍ Ocean Springs School District (104)
- ❍ Okolona School District (105)
- ❍ Oktibbeha County School District (106)
- ❍ Oxford Public School District (107)
- ❍ Pascagoula School District (108)
- ❍ Pass Christian School District (109)
- ❍ Pearl Public School District (110)
- ❍ Pearl River County School District (111)
- ❍ Perry County Schools (112)
- ❍ Petal Public School District (113)
- ❍ Philadelphia Public School District (114)
- ❍ Picayune School District (115)
- ❍ Pontotoc City Schools (116)
- ❍ Pontotoc County Schools (117)
- ❍ Poplarville School District (118)
- ❍ Prentiss County School District (119)
- ❍ Quitman County School District (120)
- ❍ Quitman School District (Clarke County) (121)
- ❍ Rankin County School District (122)
- ❍ Richton School District (123)
- ❍ Scott County School District (124)
- ❍ Senatobia Municipal School District (125)
- ❍ Shaw School District (126)
- ❍ Simpson County School District (127)
- ❍ Smith County School District (128)
- ❍ South Delta School District (129)
- ❍ South Panola School District (130)
- ❍ South Pike School District (131)
- ❍ South Tippah School District (132)
- ❍ Starkville School District (133)
- ❍ Stone County School District (134)
- ❍ Sunflower County School District (135)
- ❍ Tate County Schools (136)
- ❍ Tishomingo County Schools (137)
- ❍ Tunica County School District (138)
- ❍ Tupelo Public School District (139)
- ❍ Union County School District (140)
- ❍ Union Public School District (141)
- ❍ Vicksburg-Warren School District (142)
- ❍ Walthall County School District (143)
- ❍ Water Valley School District (144)

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- Wayne County School District (145)
- Webster County School District (146)
- West Bolivar School District (147)
- West Jasper School District (148)
- West Point School District (149)
- West Tallahatchie School District (150)
- Western Line School District (151)
- Wilkinson County School District (152)
- Winona School District (153)
- Yazoo City Municipal School District (154)
- Yazoo County School District (155)

Q48 Which Independent/Private School System are you employed at?
- Adams Count Christian School (1)
- Amite School Center (2)
- Bayou Academy (3)
- Ben's Ford Christian School (4)
- Benedict Day School (5)
- Benton Academy (6)
- Bowling Green School (7)
- Briarfield Academy (8)
- Brookhaven Academy (9)
- Calhoun Academy (10)
- Calvary Christian School (11)
- Canton Academy (12)
- Carroll Academy (13)
- Cedar Lake Christian Academy (14)
- Cenla Christian Academy (15)
- Central Academy (16)
- Central Christian School (17)
- Central Hinds Academy (18)
- Central Holmes Christian School (19)
- Central Private School (20)
- Central School (21)
- Centreville Academy (22)
- Chamberlain-Hunt Academy (23)
- Christ Covenant School (24)
- Christ Missionary & Industrial (25)
- Christian Collegiate Academy (26)
- Claiborne Academy (27)
- Clinton Christian Academy (28)
- Colonial Hts. Baptist Church Kindergarten (29)
- Columbia Academy (30)

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- ❍ Copiah Educational Foundation (31)
- ❍ Deer Creek School (32)
- ❍ Delta Academy (33)
- ❍ DeSoto School (34)
- ❍ East Rankin Academy (35)
- ❍ First Presbyterian Church Kindergarten (36)
- ❍ First Presbyterian Day School (37)
- ❍ First United Methodist Kindergarten (38)
- ❍ Franklin Academy (39)
- ❍ Gateway Christian Academy (40)
- ❍ Glenbrook School (41)
- ❍ Grace Community School (42)
- ❍ Greenbrook Baptist Church Kindergarten (43)
- ❍ Greenville Christian School (44)
- ❍ Hartfield Academy (45)
- ❍ Hebron Christian School (46)
- ❍ Heidelberg Academy (47)
- ❍ Heritage Academy (48)
- ❍ Hillcrest Christian School (49)
- ❍ Humphreys Academy (50)
- ❍ Immanuel Christian School (51)
- ❍ Indianola Academy (52)
- ❍ Jackson Academy (53)
- ❍ Jackson Preparatory School (54)
- ❍ Jubilee Preforming Arts Center (55)
- ❍ Kemper Academy (56)
- ❍ Kirk Academy (57)
- ❍ Lamar Christian School (58)
- ❍ Lamar School (59)
- ❍ Laurel Christian School (60)
- ❍ Leake Academy (61)
- ❍ Lee Academy (62)
- ❍ Madison-Ridgeland Academy (63)
- ❍ Magnolia Heights School (64)
- ❍ Manchester Academy (65)
- ❍ Marshall Academy (66)
- ❍ Marvell Academy (67)
- ❍ Mother Goose Christian Academy (68)
- ❍ Mt. Salus Christian School (69)
- ❍ Newton Academy (70)
- ❍ North Delta School (71)
- ❍ North Sunflower Academy (72)
- ❍ Oak Forest Academy (73)

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- ○ Oak Hill Academy (74)
- ○ Oxford University School (75)
- ○ Park Place Christian Academy (76)
- ○ Parklane Academy (77)
- ○ Pillow Academy (78)
- ○ Pinelake Christian School (79)
- ○ Porter's Chapel Academy (80)
- ○ Prairie View Academy (81)
- ○ Prentiss Christian School (82)
- ○ Presbyterian Christian School-Hattiesburg (83)
- ○ Presbyterian Day School- Clarksdale (84)
- ○ Presbyterian Day School - Cleveland (85)
- ○ Presbyterian Day School - Kosciusko (86)
- ○ Rebul Academy (87)
- ○ River Oaks School (88)
- ○ River of Life School of Excellence (89)
- ○ Riverdale Academy (90)
- ○ Riverfield Academy (91)
- ○ Salem Christian School (92)
- ○ Seminary Baptist Kindergarten (93)
- ○ Sharkey Issaquena Academy (94)
- ○ Silliman Institute (95)
- ○ Simpson Academy (96)
- ○ Starkville Academy (97)
- ○ Strider Academy (98)
- ○ Sumrall Baptist Kindergarten (99)
- ○ Sylva Bay Academy (100)
- ○ Tallulah Academy (101)
- ○ Tensas Academy (102)
- ○ The Veritas School (103)
- ○ Tri-County Academy (104)
- ○ Trinity Episcopal Day School (105)
- ○ Trinity Pre-School (106)
- ○ Tunica Academy (107)
- ○ Union Christian Academy (108)
- ○ Washington School (109)
- ○ Wayne Academy (110)
- ○ West Memphis Christian School (111)
- ○ Westminster Academy (112)
- ○ Wilkinson County Christian Academy (113)
- ○ Winona Christian School (114)
- ○ Winston Academy (115)
- ○ Other (includes Homeschooling) (116)

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Q49 Do you have a primary subject that you teach?
- ○ Yes (please specify) (1) _____
- ○ No (2)

Q50 Select primary grade of your students. You may select multiple grades if you teach combined/ multiple classes. Hold Ctrl to select multiple
- ❑ Pre-kindergarten (1)
- ❑ Kindergarten (2)
- ❑ First (3)
- ❑ Second (4)
- ❑ Third (5)
- ❑ Fourth (6)
- ❑ Fifth (7)
- ❑ Sixth (8)
- ❑ Seventh (9)
- ❑ Eighth (10)
- ❑ Ninth (11)
- ❑ Tenth (12)
- ❑ Eleventh (13)
- ❑ Twelfth (14)

Q51 What is your primary teaching certification subject or specialty area?

Q52 Select your race, may select multiple
- ❑ American Indian or Alaska Native (1)
- ❑ Asian (2)
- ❑ African American or Black (3)
- ❑ Native Hawaiian or Pacific Islander (4)
- ❑ White (5)
- ❑ Prefer not to answer (7)
- ❑ Other (please specify) (6) _____

Q53 Select your ethnicity
- ○ Hispanic or Latino (1)
- ○ Non-Hispanic or Latino (2)
- ○ Prefer not to answer (3)

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Q54 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

APPENDIX D

PROJECT LEARNING TREE (PLT) FACILITATOR COVERSHEET

PROJECT LEARNING TREE® FACILITATOR COVERSHEET

(Please fasten securely to accompanying PARTICIPANTS' WORKSHOP SURVEY FORMS)

Facilitator Information:

Name: _____	Name: _____	Name: _____
Address: _____	Address: _____	Address: _____
Email: _____	Email: _____	Email: _____
Phone: _____	Phone: _____	Phone: _____

Workshop Information:

Workshop Date _____

Location (City, State) _____

Workshop Length _____

# of participants _____

# of participant survey forms attached _____

Workshop Type:
- ☐ Early Childhood ☐ Secondary
- ☐ PreK-8 ☐ Preservice
- ☐ PreK-12 ☐ Facilitator

Was this a Joint Workshop?
- ☐ With WET
- ☐ With WILD
- ☐ With WET & WILD

 # PLT Guides Distributed:

____ PreK-8	____ Focus on Risk
____ Energy & Society	____ Solid Waste
____ Focus on Forests	____ Places We Live
____ Forest Ecology	____ Forests of the World

Training in Online Modules:
- ☐ Biodiversity
- ☐ Intro Handbook for Secondary Modules

Discussion of Service-Learning:
- ☐ *GreenWorks!*

Demonstration of Online Resources:
- ☐ Resources by Activity
- ☐ Earth & Sky
- ☐ Urban Forestry
- ☐ *Branch* newsletter

Workshop Summary: *(For PLT State Coordinator's use. Below are examples of information you may want to collect for your state PLT program. Adapt the following for your own purposes as you wish.)*

1. Briefly outline your workshop format, specifying which PLT activities from the PreK-8, secondary modules, or other PLT materials you included, or attach an agenda.

2. Summarize expenses and/or revenues involved in your workshop. Include any in-kind support from local sources, for example, agency, community, or industry personnel or contributions.

3. Tell us your overall view of the workshop – include problems/successes and your assessment of the participants' responses.

4. I would _____ would not _____ be interested in facilitating another PLT workshop because:

Please complete one of these forms each time a different group of participants is involved. The PLT staff would like to thank you for your time and effort in providing this information.

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APPENDIX E

PROJECT LEARNING TREE (PLT) PARTICIPANT SURVEY FORM

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PROJECT LEARNING TREE® PARTICIPANT SURVEY FORM

PLT

Thank you for your interest in Project Learning Tree. Your comments are essential to ensuring Project Learning Tree programs and materials are as useful as possible for all educators. We never sell or give your contact information to any third party.

Workshop Information: Please use a pen

Workshop Date: _____

Workshop Location: _____

Workshop Facilitators: _____

_____

Workshop Type (circle all that apply)		
PreK-8	Secondary	Fire
PreK-12	Energy & Society	Early Childhood
Preservice	Other (Specify): _____	

Participant Information:

Name: _____

Permanent Mailing Address: _____

City: _____ State: _____ Zip: _____

Email: _____

☐ Check box if you would like to receive PLT updates and notification of new editions of the *Branch*, PLT's quarterly on-line newsletter.

School/Organization: _____

Circle all that apply:

1. My position is: Preschool Teacher   Elementary Teacher   Middle School Teacher   Preservice or University Student
   High School Teacher   Nonformal Educator   Homeschool Educator   Resource Professional
   Administrator   Scout Leader   Other (Specify) _____

2. Years teaching: _____ Number of students reached/year: _____ Student Demographics: Urban   Suburban   Rural

3. In what subjects will you use PLT? Arts   Language Arts   Math   Physical Education   Reading   Science
   Social Studies   Special Education   Other (Specify) _____

4. How often do you think you will use PLT activities?   Weekly   Monthly   Several times a year
   Other (Specify) _____

Workshop Evaluation:

	⊗ Disagree			Agree ☺
A. The information, strategies, and instructional methods shared were helpful to you.	1	2	3	4	5
B. The workshop prepared you to use the PLT materials with your audience.	1	2	3	4	5
C. PLT materials will help you address state academic standards.	1	2	3	4	5

	Needs Improvement			Excellent
D. The facilitators for this workshop were:	1	2	3	4	5
E. Overall this workshop was:	1	2	3	4	5

F. The greatest value of the workshop for use with your audience was:

G. How could the workshop be improved?

I. Additional Comments:

Go to www.plt.org for more information about PLT

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