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## The Effect of Teacher Beliefs and Self-Efficacy on Environmental Education Program Implementation

Ashley Wilson Mullens

*Louisiana State University and Agricultural and Mechanical College*

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The Effect of Teacher Beliefs and Self-Efficacy  
on Environmental Education Program Implementation

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

School of Human Resources and Workforce Development

by  
Ashley W. Mullens  
B. S., Louisiana State University, 2002  
M.S., Louisiana State University, 2007  
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## ABSTRACT

This study describes the development and initial validation of a tool to measure teachers' beliefs about environmental education (EE), perceptions about their own self-efficacy in implementing EE in their classroom, perceptions about the support they receive in regards to implementing EE in their classroom, the perceived motivators towards EE, and the perceived barriers towards EE. This instrument was then utilized to measure these five constructs and compare results between participants and non-participants of a school-based environmental education program. All respondents had positive beliefs about environmental education. Participants and non-participants did differentiate between their perceptions of self-efficacy, support, and motivators, suggesting that teachers with high levels of self-efficacy, more motivators, and perceptions of adequate support would be more likely to participate in a school-based environmental education program. Study results also indicate that a teacher's perceived self-efficacy predicts participation in a school-based environmental education program. Finally, this study examined how a school-based environmental education (EE) program was implemented by teacher participants. Results indicated that most teachers implemented the school-based EE program with moderate fidelity. The results of this study have implications for the evaluation and improvement of program design and curricula of school-based EE programs.



## CHAPTER 1: INTRODUCTION

### **Introduction**

Environmental education (EE) is a life-long learning process about the environment that is grounded on the study of relationships between natural and human systems (No Child Left Inside Coalition, n.d.; UNESCO, 1977). EE strives to engage youth and adults into a new way of thinking and acting towards the environment. EE efforts are driven by a need to develop a well-informed, engaged citizenry that will make choices that positively impact the environment (Carleton-Hug & Hug, 2010).

EE programs targeting youth are typically non-formal programs held outside of school settings. However, school-based EE programs also proved to be an effective means of teaching about the environment within the confines of a formal classroom (Crohn & Birnbaum, 2010; Lieberman & Hoody, 1998). Numerous studies have shown that school-based EE programs increase student achievement, improve student attitudes towards the environment, and create environmentally friendly behaviors in youth (Carleton-Hug & Hug, 2010; Iozzi, Laveault, & Marcinkowski, 1990; Ramsey and Hungerford, 1989). Unfortunately, with the implementation of the Elementary and Secondary Education Act in 2007, also known as the No Child Left Behind Act, formal educators have been under intense pressure to focus classroom instruction on subjects assessed in standardized testing (No Child Left Inside Coalition, n.d.). Research has shown that the commitment to teaching only those subjects and standards has led to a reduction in classroom time spent on other subjects, such as EE (No Child Left Inside Coalition, n.d.). Because of barriers like this and other unknown variables affecting teachers' classroom practices, it is still unclear how to design meaningful and effective school-based EE programs that will be implemented by formal educators (Stevenson, 2007).

## **Rationale and Significance of the Study**

Gruenewald & Manteaw (2007) demonstrated that creative teachers who are passionate about the environment seem to resist the pressures of academic policy and develop pedagogies that utilize EE curriculum. To further explore why some teachers are able to overcome the many obstacles to teaching EE while others are not, research suggests examining teachers' beliefs and perceptions. Past studies have suggested that teachers' beliefs and perceptions predict their classroom practices (Forbes & Zint, 2010; Hsu, 2004; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001; Zint & Peyton, 2001). Learning how beliefs and perceptions affect what teachers do in their classroom can better inform EE curricula designers when trying to create an effective school-based EE program that will be implemented by teachers (Forbes & Zint, 2010; Newhouse, 1990; Pooley & O'Connor, 2000).

## **Purpose of the Study**

The purpose of this study is to determine if relationships exist between teacher beliefs about environmental education, teacher perceptions (self-efficacy, support, motivators, and barriers) about environmental education, and teacher implementation of a school-based environmental education program, the 4-H Youth Wetlands Education and Outreach Program.

## **Objectives of the Study**

1. To describe Louisiana teachers'
  - a. Beliefs about environmental education,
  - b. Perceived self-efficacy for teaching environmental education,
  - c. Perceived support for teaching environmental education,
  - d. Perceived motivators towards teaching environmental education,
  - e. Perceived barriers towards teaching environmental education,

- f. Years of teaching experience,
  - g. Grades taught, and
  - h. Subjects taught.
- 2. To compare participants and non-participants of a school-based EE program based on their beliefs about, perceived self-efficacy for, perceived support for, and perceived motivators and barriers towards teaching environmental education.
- 3. To determine if a model exists explaining a significant portion of the variance in participation of Louisiana teachers' in a school-based environmental education program from the following measures: teachers' beliefs about, perceived self-efficacy for, perceived support for, perceived motivators and barriers towards teaching environmental education.
- 4. To determine if a model exists explaining a significant portion of the variance in program fidelity of implementation of the 4-H Youth Wetlands Education and Outreach Program by participants from the following measures: participants' beliefs about, perceived self-efficacy for, perceived support for, and perceived motivators and barriers towards teaching environmental education.

### **Definitions of Terms**

For the purposes of this study, the following terms were defined:

**4-H:** 4-H is the nation's largest youth development organization with more than 6 million youth participants. Programmatic efforts are done through 109 land-grant universities and the Cooperative Extension System (National 4-H Headquarters, 2012).

**Beliefs:** information that a person accepts to be true (Koballa & Crawley, 1985).

**Environmental Education:** a learning process that increases a person's knowledge and

awareness about the environment through the study of relationships between natural and human systems (No Child Left Inside Coalition, n.d.; UNESCO, 1977).

**Environmental Literacy:** an understanding, at some basic level, of the interaction of humans and their natural environment with regard to both living things and non-living things (air, water, soil, and rocks) (Rockcastle, 1989).

**Fidelity:** whether prescribed program components were delivered as instructed in program protocol (Berkel, Mauricio, Schoenfelder, & Sandler, 2011).

**Implementation:** what a program consists of when it is delivered in a particular setting (Durlak & Dupre, 2008).

**Self-Efficacy:** an individual's perceived confidence in their ability to perform the behavior in question (Bandura, 1977).

**Wetlands:** areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas (Environmental Protection Agency (EPA), 1972).

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## CHAPTER 2: REVIEW OF LITERATURE

### **Environmental Education**

Environmental education (EE) originated as a concept from nature and outdoor study at school-based camps in the early 1900's and later to the international conservation movement in the 1930's (McCrea, 2006; Stevenson, 2007b). The creation of the study of nature was meant to help youth develop an understanding and appreciation of the natural environment through direct observations (Stevenson, 2007b). The conservation movement then introduced concern for the preservation of natural species and areas of natural significance through sound management practices (Stevenson, 2007b). Today many consider April 22, 1970, the date of the first Earth Day celebration, as the birthdate of the modern environmental movement (Freeman, 2002). More recently, the passage of the National Environmental Education Act of 1990 and the establishment of the Office of Environmental Education in the U.S. Environmental Protection Agency has nurtured the field of EE (McCrea, 2006).

The ultimate goal of EE is changing human behavior that results in a healthful and healing environment (Bennett, 1984; Hungerford & Volk, 1990). The Tbilisi Declaration of 1977, considered to be "one of the most important seminal documents in EE" (p.1), defined specific objectives that would help achieve this goal that included increased awareness, sensitivity, and understanding of the environment and environmental issues, increased skills to identify environmental problems, acquisition of feelings of concern for the environment, the tenacity to do something about these concerns, and the encouragement to be actively involved in working towards a resolution (Hungerford & Volk, 1990; UNESCO, 1977). Specifically, the Tbilisi Declaration (UNESCO, 1977) states:

Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the

contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values. (p.24)

EE aims to develop a citizenry that is well-informed and desires to take action to solve environmental issues; it is a commitment to activism (Lane, Wilke, Champeau, & Sivek, 1995; Stevenson, 2007b). EE not only promotes increased knowledge and improved attitudes and behaviors towards the environment but also challenges participants to be active members of society (Hungerford & Volk, 1990). A study by Waliczek and Zajicek (1999) found that youth who were exposed to the outdoors were more likely to increase their environmental stewardship. EE makes education relevant to real-world concerns and inspires youth to deal with real problems and issues that influence their lives (Bennett, 1984). EE promotes collaborative inquiry projects that involve critical thinking, contributions to community problems and solutions, and participation in local democracy (Gruenewald & Manteaw, 2007; Stevenson, 2007a).

There are varying perspectives on what exactly are the root causes of environmental problems. For instance, the issue of global warming has been heavily debated since 1988 and is a controversial topic today (McCright & Dunlap, 2000). Varying opinions on environmental problems and their solutions are why it is essential that youth learn to examine all perspectives, judge the merit of each stance, and form their own opinions (Stevenson, 2007b). EE programs should include inquiry, critique, and reflection activities that develop student knowledge on the political processes and advocacy that influence environmental reform (Stevenson, 2007b). In effective EE programs, youth are encouraged to develop their own set of environmental beliefs and gain the knowledge to defend them (Stevenson, 2007b). A 1995 study by Lane et al. stated people who actively participate in efforts to try and resolve environmental issues contributes to



their development of environmentally responsible behavior. It is the hope that after youth are exposed to EE that they then pursue action to achieve environmental reform on the ideals that they support and feel confident that they can influence environmental decision-making (Stevenson, 2007b).

Teaching and learning in EE is intended to be a highly flexible, cooperative process of inquiry into real environmental issues associated within the realm of students' lives and how to they can take action on these issues (Stevenson, 2007b). EE is interdisciplinary and encourages a holistic approach that aims to weave ideas and concepts from all subjects (Lonning, DeFranco, & Weinland, 1998; Moss, 2003). EE focuses on student engagement and is student-led (Stevenson, 2007a). The students, not the teachers, must actively engage in critical and complex thinking by participating in more challenging activities than are offered by traditional standard-based curriculum (Stevenson, 2007b). EE activities and assessments engage students in a higher order of critical thinking and allow them the freedom, time, and space to explore the world around them, analyze environmental issues, and practice problem-solving skills (Stevenson, 2007a). As students study and analyze a topic, the ideas become integrated into their prior knowledge base and allow them to make connections between information, instead of remaining as newly learned disconnected skills and ideas (Newmann, Bryk, & Nagaoka, 2001). However, the mere appearance of this new, challenging curriculum in schools is not enough. Teachers will have to acquire new teaching methods and more knowledge to utilize these materials effectively (Newmann et al., 2001).

### **Formal Education**

The purpose of formal education is to transmit basic knowledge, develop basic skills, and to convey a broad understanding of society (Stevenson, 2007b). Current practices utilized in

formal K-12 institutions work against the goals of EE by isolating schools from the surrounding community, fragmenting learning into separate time allotments by subject area, utilizing a standards-based curriculum with an emphasis only on core subjects, and encouraging teacher-centered pedagogies that diminish the process of inquiry based learning (Carnoy & Rhoten, 2002; Gruenewald & Manteaw, 2007; Stevenson, 1987). Education focuses on structure and classroom order; curriculum is discipline-based with abstract theoretical problems (Stevenson, 2007a). Instead of engaging in any type of critical and reflective analyses, students are generally asked to regurgitate facts (Stevenson, 2007b). Annually, students are assessed using standardized tests and compared nationally and internationally to determine the quality of education they are receiving (Carnoy & Rhoten, 2002; Stevenson, 2007). Therefore, throughout the school year, teachers are focused on preparing students to take this test, not on inspiring them to become responsible environmental citizens (Stevenson, 2007a). Because of this and other known barriers, we are still learning how to implement meaningful and effective EE programs in school settings (Stevenson, 2007a). EE still struggles to establish a standard of practice across the field of education because it continues to be marginalized, misunderstood, and even totally neglected due to the emphasis on utilization of a standards-based curriculum (Crohn & Birnbaum, 2010; Gruenewald & Manteaw, 2007; Stevenson, 1987). Creative teachers who are passionate about the environment seem to resist the pressures of academic policy and develop pedagogies and utilize curriculum that support the goals of EE (Gruenewald & Manteaw, 2007). However, there are numerous barriers that restrict the large-scale implementation of EE into formal classrooms across the United States. Research has shown that constraints include lack of professional development opportunities for teachers (Lane et al., 1995; Newmann et al., 2001), limited time and space (Powers, 2004; Stevenson, 2007a), lack of environmental knowledge in

teachers (Stevenson, 2007a), lack of administrative support (Stevenson, 2007a), and general overall financial cuts to education (Ham & Sewing, 1988).

### **Teacher Beliefs and Self-Efficacy**

Past research has explored teachers' perceptions of EE (Forbes & Zint, 2010; Hsu, 2004; Ko & Lee, 2003; McCaw, 1979; Plevyak, Bendixen-Noe, Henderson, Roth, Wilke, 2001; Zint & Peyton, 2001). These studies have included research on teacher beliefs (Forbes & Zint, 2010), and teacher self-efficacy (Forbes & Zint, 2010). Past research has shown that teachers' beliefs and competencies are important predictors of their classroom practices so understanding these variables is important to understand what they actually do in their classroom (Forbes & Zint, 2010; Hsu, 2004; Plevyak et al., 2001; Zint & Peyton, 2001). Identifying these variables and their determinants can better inform EE programs (Newhouse, 1990; Pooley & O'Connor, 2000). Learning more about teacher beliefs and their perceived self-efficacy for teaching EE in their classroom will allow environmental educators to better support teachers in implementing their EE programs (Forbes & Zint, 2010).

### **No Child Left Behind Act**

The No Child Left Behind (NCLB) Act of 2001 was President George W. Bush's top priority during his 2000 election campaign in his effort to reform public education (DeBray, 2005; Gruenewald & Manteaw, 2007). Supported by both the Republican and Democratic parties, much of what happens in regards to formal education in the United States today is viewed through the lens of this Act (Gruenewald & Manteaw, 2007). This legislation is sold as a way to end educational inequality. The publication of *A Nation at Risk* in 1980 even linked standards, testing, and teacher/school accountability to America's ability to successfully keep

pace with other nations in the global economic competition. The purpose of the NCLB Act (NCLB, 2001) is

to ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging State academic achievement standards and state academic assessments. This purpose can be accomplished by – (1) ensuring that high quality academic assessments, accountability systems, teacher preparation and training, curriculum, and instructional materials are aligned with challenging State academic standards so that students, teachers, parents, and administrators can measure progress against common expectations for student academic achievement. (Sec. 1001.1)

Because the achievement gap demonstrated by student scores on standardized tests has been touted as the most significant educational challenge facing American society in the 21<sup>st</sup> century, standards-based curricula devoid of any environmental content is mandated by the majority of K-12 institutions in the United States (Gruenewald & Manteaw, 2007). The standardized tests focus only on measuring student achievement in traditional content areas and holds teachers and schools accountable for the results (Gruenewald & Manteaw, 2007). Consequently, the pressure on teachers to prepare their students for standardized tests does not encourage the utilization of outdoor, experiential, project-based, placed-based learning (Gruenewald and Manteaw, 2007).

The pressures of accountability have resulted in EE programs having to play the “achievement game” and correlate their goals with state standards (Gruenewald & Manteaw, 2007). To garner teacher support in the midst of them trying to maintain passing test scores, EE programs must demonstrate how their program supports measurable student outcomes on these assessments (Gruenewald & Manteaw, 2007). Although this goes against the historic goals and expectations of EE, many EE practitioners feel that making this accommodation is the only way to get more EE in formal institutions (Gruenewald & Manteaw, 2007). Teachers and schools need to be held accountable for student achievement but EE should be included in what they are

made accountable for (Gruenewald & Manteaw, 2007). The movement to increase the implementation of EE in schools does not support the elimination of standards or the usage of standards-based curriculum, but only hopes to challenge the mindset that standardized testing is the only way to demonstrate accountability and student achievement (Gruenewald & Manteaw, 2007).

### **No Child Left Inside Act of 2007**

As a response to the NCLB Act, the No Child Left Inside (NCLI) initiative was formed in 2007 to help progress the incorporation of EE in formal K-12 institutions across the United States (Larson, Castleberry, and Green, 2010; NAAEE, 2013). A coalition was formed to support Representative John Sarbanes (Maryland) and Senator Jack Reed (Rhode Island) who proposed legislation aimed to ensure students in the United States would achieve basic environmental literacy upon completion of their secondary education (NAAEE, 2013). This proposed act would amend the NCLB Act to include EE (NAAEE, 2013). This legislation would provide additional funding to EE, develop standards to align with environmental literacy goals, provide EE-related professional development opportunities for educators, and would recommend that each state develop and implement a state-wide environmental literacy plan (NAAEE, 2013). The North American Association for Environmental Education (NAAEE) (2013) defines an environmentally literate person as:

Someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and global environment; and participates in civic life (p. 2).

## Environmental Literacy Plans

On February 11, 2015, the NCLI Act was reintroduced into both the Senate and the United States House of Representatives (American Camp Association, 2015). Although the discussion of amending the Elementary and Secondary Education Act (ESEA) with the NCLI Act has not yet been taken up on the floor of either chamber of the House or the Senate, many states are progressing with the integration of EE on a statewide level through the development and implementation of a state environmental literacy plan (NAAEE, 2013). A study by Coyle (2005) stated that “the environmentally literate person is significantly more likely to engage in a set of pro-environmental activities than someone who is less environmentally literate” (p. 43). The NAAEE stated in a 2013 status report that 48 states had completed some, if not all of the work, on their state environmental literacy plan. The majority of these 48 states reported that their state EE association was responsible for the development of this plan and that these associations utilized the national guidelines developed by NAAEE, entitled *Excellence in Environmental Education: Guidelines for Learning (PreK–12)*, to review existing content standards before beginning development (NAAEE, 2013).

The NCLI Act details that although individual states may use their own approach to the development and implementation of their environmental literacy plan, all plans must include the following (NAAEE, 2013):

- a.) Specific content standards, content areas, and courses or subjects where instruction will take place,
- b.) A description of how state high school graduation requirements will ensure that graduates are environmentally literate,
- c.) A description of programs for professional development of teachers to improve their environmental content knowledge, skill in teaching about environmental issues, and field-based pedagogical skills, on of how the state education agency will measure the environmental literacy of students, and
- e.) A description of how the state education agency will implement the plan, including securing funding and other necessary support. (p. 3)

## **Louisiana Environmental Literacy Plan**

Although in draft form, the state of Louisiana does have an environmental literacy plan. According to Venise Ortego, Environmental Education State Coordinator of Louisiana, the status of the plan is that it is under review by the Louisiana Governor's Office (V. Ortego, personal communication, 2015). The three main reasons for the development of an environmental literacy plan for Louisiana are ecosystem health, children health, and green jobs (Louisiana Environmental Literacy Plan Subcommittee, 2014). According to the Louisiana Environmental Literacy Plan (ELP) Subcommittee (2014), the ELP states

The vision of the ELP is to establish a population that understands, feels connected to, and is inspired to protect, preserve, and restore our environment for present use and future sustainability. This means that "environmentally literate" citizens will have the knowledge, tools, and sensitivity to thoughtfully explore environmental issues, select optimal actions to mediate problems, and routinely include the environment as a crucial element in their work, play, and daily life. (p.1)

There are five main elements outlined in Louisiana's ELP: 1.) Public Outreach – to inform and engage citizens about environmental literacy and EE opportunities, 2.) Environmental Career Pathways – to develop a workforce that can improve Louisiana's environment, and in turn, its economy, 3.) Professional Development Opportunities for Formal and Non-Formal Educators – to increase environmental knowledge and help educators become more effective teachers, 4.) Unified Pre-K – 20 Education Approaches – to incorporate environmental literacy into Louisiana's academic standards, and 5.) Plan Implementation – to ensure all citizens have the necessary resources needed to make informed decisions about the environment (Louisiana Environmental Literacy Plan Subcommittee, 2014).

Specifically to Louisiana, environmental literacy encompasses coastal restoration and protection (Louisiana Environmental Literacy Plan Subcommittee, 2014). Coastal land loss and water quality issues in fresh and marine ecosystems are at the forefront for Louisiana citizens.

The state needs an informed citizenry to not only make decisions today (adults) but also tomorrow (youth) in order to protect these valuable ecosystems (Louisiana Environmental Literacy Plan Subcommittee, 2014). This goal of the Louisiana ELP is supported by NAAEE research from 2004 that states inclusion of locally relevant topics is essential in the creation and implementation of an effective EE program.

#### **4-H Youth Wetlands Education and Outreach Program**

Educating Louisiana youth on the importance of wetland ecosystems is critical to the survival of the state's unique lands and waters. The Louisiana ELP states that protecting these natural resources is one of the driving forces of the creation of a state ELP (Louisiana Environmental Literacy Plan Subcommittee, 2014). EE programs that specifically focus on wetland ecosystems are rare. Project WET is one example of a national EE program that touches on wetlands, but its main focus is to emphasize personal responsibility related to water issues (Fortner, 1995). Closer to home, Coastal Roots, was initiated by Louisiana State University (LSU) and the Louisiana Sea Grant College Program in 2000 (Karsh, 2005). As the first program of this type and still in existence today, Coastal Roots provides youth with environmental stewardship opportunities. Coastal Roots is an international award winning program but lacks a program-specific, in-class teaching component.

The 4-H Youth Wetlands Education and Outreach Program (4-H YWP) was created in 2007 by two state agencies, the LSU Agricultural Center (AgCenter) and the Louisiana Department of Natural Resources (LDNR), in an effort to raise awareness in Louisiana youth about the serious problem of wetland loss and inspire them towards activism. The 4-H YWP curriculum focuses on inspiring nature connectedness by employing authentic, inquiry-based learning experiences that utilize the outdoors (Bergman, 2015). This curriculum was created



through a collaboration of program staff and formal educators because research has shown that teachers' enthusiasm on a subject matter is more likely to be expressed when they help to design the EE curricula that they implement. In addition, the majority of environmental educators are not skilled in teaching methods so teachers should be involved in the construction of EE curriculum (Rickinson 2001; Stevenson, 2007a). The 4-H YWP curriculum is associated to Louisiana's Grade Level Expectations (GLE's) and the more recently mandated Common Core State Standards. The 4-H YWP immerses students in wetland-related lesson plans to teach them the value of Louisiana's wetlands. Through these lesson plans students are encouraged to utilize critical thinking to solve a real-world problem (Chawla & Cushing, 2007). Utilizing this place-based curriculum to relate the real-world issue of wetland loss to students' lives, youth take a personal interest in this environmental issue and hopefully realize the effect that their actions have on the environment.

### **Program Implementation**

According to Durlak & DuPre (2008), implementation refers to "what a program consists of when it is delivered in a particular setting" (p. 329). It is considered anything with potential benefit that pertains to products, programs, theories, policies, or ideas (Durlak, 2010).

Implementation is not a static, one-time event. It is not an all or none phenomenon. It is a non-linear, cyclical process that occurs over time (Durlak, 2010; Durlak & DuPre, 2008; Fixsen, Blase, Naoom, & Wallace, 2009). The aim of proper implementation is simple: to have practitioners use researchers' findings effectively (Fixsen et al., 2009).

Historically, the translation of research into practice was considered a passive process where it was assumed that information would somehow diffuse to people who would put research innovations into practice (Fixsen et al., 2009; Simpson, 2002). According to this

mindset, researchers conducted studies and published their findings, consumers (i.e., managers and practitioners) located and read literature, and proceeded to utilize the newly gained information to improve their work (Fixsen et al., 2009). The entire burden of using scientific evidence in practice primarily fell on practitioners (Wakefield & Kirk, 1996). However, in recent years, people have started to make translation a more active process (Fixsen et al., 2009) and have moved from a “letting it happen” to a “making it happen” (p. 593) mentality (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004). This means that experts work with organizations, systems, and practitioners in an implementation process to assure benefits to consumers from a high fidelity usage of products and services; they work together to conquer the knowledge application challenge (Fixsen et al., 2009; Proctor & Rosen, 2007).

For practitioners to utilize research advancements effectively, a program must first identify and then integrate the important program parts necessary for program effectiveness, known as the core implementation components (Fixsen et al., 2009). Core components are considered the active ingredients of an intervention or the mechanism of change. Each one should be carefully considered to determine the role it plays in supporting program implementation (Durlak, 2010; Fixsen et al., 2009). Identifying these essential core components informs practitioners about what needs to be replicated precisely, for how long and for what intensity, and what can be adapted or eliminated (Durlak, 2010). Fixsen et al. (2009) speculate that these components may provide a flexible enough approach that ensures high fidelity implementation.

### **Implementation Research**

The field of implementation research has grown but is still not well understood (Peters, Adam, Alonge, Agyepong, & Tran, 2013). This type of research is critical to understand and

improve interventions and necessary for researchers to be able to ascertain the external validity of an intervention (Durlak, 2010; Durlak & DuPre, 2008). Implementation research works to improve the translation of research into practice, or science to service (Fixsen et al., 2009; Michie, van Stralen, & West, 2011). The “to” in the science to service represents all of the activities deemed implementation and has been touted as “the missing link” (p. 538) (Fixsen et al., 2009). The need for this type of research was first realized in the 1980’s when the public health sector identified extreme variation between what was known and what was done (Bhattacharyya, Reeves, & Zwarenstein, 2009; Peters et al., 2013). This large gap between knowledge and practice is said to exist due to poor quality guidelines that are not evidence-based and ineffective dissemination of information to practitioners (Bhattacharyya et al., 2009). In a 2009 study, Fixsen et al. stated that to close this science to service gap there was a need to 1.) develop measures of implementation, 2.) develop training academies for implementation studies, and 3.) engage policy makers and politicians. Currently, there is a large amount of interest in implementation and researchers in multiple disciplines (political science, physical health, education, mental health, marketing, business) are finally recognizing its importance (Durlak, 2010; Fixsen et al., 2009; Peters et al., 2013).

According to Peters et al. (2013), implementation research is “the scientific inquiry into questions concerning the act of carrying an intention into effect” (p. 731). The intent of implementation research is to solve implementation problems by trying to understand what, why, and how interventions work in the “real world” rather than controlling for or removing certain conditions (Peters et al., 2013). The goal is to change the behaviors of practitioners to be as close to behaviors that have proven to be effective (Bhattacharyya et al., 2009). Implementation research is not conducted to simply add to the body of knowledge in a specified discipline but is

concerned with the consumers of the research, such as managers, policy makers, and practitioners (Peters et al., 2013). Successfully transferring effective programs into real-world settings is a complicated process known as diffusion; a lot can happen between the initial phase of program design to what eventually occurs (Durlak, 2010; Durlak & DuPre, 2008;). To highlight this point, in their assessment of over 500 implementation studies, Durlak & DuPre (2008) indicated that the process of disseminating effective interventions to an actual population (i.e., real-world settings) usually had unimpressive returns (Durlak & DuPre, 2008).

Powerful benefits can result from effective implementation (Durlak, 2010). In their 2008 study, Durlak and DuPre determined that the level of implementation positively affected program outcomes. This finding was also supported by a Derzon, Sale, Springer, and Brounstein (2005) study that indicated if implementation problems would be corrected, programs would be 12 times more effective than they were currently. Implementation failure wastes resources and increases the likelihood that programming efforts will not have the desired results (Fagan, Hanson, Hawkins, & Arthur, 2008).

### **Implementation Research in Education Field**

Implementation research in the field of education first appeared in a study by Berman and McLaughlin (1976) in the 1970's; however, it never gained much traction. As recently as 2009, Warren, Domitrovich, and Greenburg stated that implementation research was emerging as a new and important concept in youth development and curriculum research. Since then, it has been named a priority in early childhood education (Durlak, 2010). The majority of existing literature on educationally-related implementation research highlights pilot and proof-of-concept studies that focus on the impact that a certain curriculum has on the development and knowledge of youth (Looi & Wong, 2014). It is rare to read about the progression of how an intervention

actually becomes an integral part of classroom practice (Looi & Wong, 2014). Ben-Peretz (1980) stated that if enough was known about the curriculum implementation process, research findings and developments might actually be utilized by practitioners. That is why it is critical for educational experts to resist developing new educational programs and focus their efforts on understanding what works and how they can consistently deliver it (Woolf & Johnson, 2005).

Implementation research in education is critical because even if a curriculum has proven to be valuable, it must be implemented well by practitioners to positively impact youth (Odom, 2009; Odom, Fleming, Diamon, Lieber, Hanson, Butera, Horn, Palmer, & Marquis, 2010).

There is a large amount of variability in education interventions because research has shown that teachers do not implement curricula in their classroom in the same way that it was designed to be implemented (Cronin-Jones, 1991). Because of this, Barab and Leuhmann (2003) proposed that program implementation in a classroom actually follows the equation: “Teacher Perceptions + Designed Curriculum + Classroom Culture = Implemented Experience” (p. 462). Numerous variables impact a teacher’s adoption of a new curriculum into their classroom; therefore, effective implementation has to occur on a systematic (micro, meso, and macro) level (Looi & Wong, 2014).

### **Implementation Research in Environmental Education Field**

EE in formal school settings is offered in many different forms, such as field trips to outdoor natural areas, lesson integration into existing formal classroom curricula, and hands-on instruction in outdoor classrooms located on school grounds. Because there is no model for teachers to provide EE programs to their students in formal institutions, teachers spend an exorbitant amount of time searching for the best techniques (Dirks & Orvis, 2005). Therefore,

properly implemented and rigorous implementation research is critical to the advancement of EE in formal K-12 institutions (Zint, Dowd, & Covitt, 2011).

Quantitative assessments have been utilized to determine the effects of an EE program on teachers and have measured teacher satisfaction (Dirks & Orvis, 2005), effects of EE teacher in-services to reduce classroom barriers (Lane et al., 1994), effects of EE teacher in-services on teacher attitudes and behaviors (Bethel, Ellis, & Barufaldi, 1982) but many of these studies have been criticized for their lack of usefulness in actual EE program improvement (Fleming & Easton, 2010). For instance, Hayes (2001) stated that anecdotal reports from teachers indicated that Journeys, an EE program provided in K-12 formal institutions in Utah, is successful but the details on why it is considered successful and what makes it successful are vague. There is a wealth of EE programs available to teachers but despite the widespread use of these programs, such as Project WET, Project Learning Tree, and Junior Master Gardener, very few have been evaluated for their use in the classroom and there have been limited studies conducted on EE program fidelity and dosage (Dirks & Orvis, 2005).

### **Conceptual Challenges**

The most significant conceptual challenge facing implementation research is the fact that many interventions have been designed without evidence and even if they are said to be guided by theory, in real world conditions, they are not (Michie et al., 2011). Grimshaw, Eccles, Thomas, MacLennan, Ramsay, Fraser, & Vale (2006) noted that only 10% of the studies identified in their review provided rationale for their programming strategies. Consequently, it is difficult to define proper implementation if there is no evidentiary basis on why a program does what it does. According to Mihalic & Elliott (2015), an evidence-based program is “a set of coordinated services/activities that demonstrate effectiveness on a desired outcome based on

research” (p.125). Evidence-based practices should be built upon current rigorous evidence from credible sources and that evidence should be used as the basis for making decisions related to program delivery and quality (Claes, van Loon, Vandavelde, & Shalock, 2015). The utilization of evidence-based practices has been increasingly encouraged but not routinely implemented (Proctor & Rosen, 2007; Fagan et al., 2008). Valid and reliable evidence is needed to determine best practices. Empirical research must be done before a measurement of the quality of a program can be determined; implementation research is necessary component of proper program evaluation (Bhattacharyya et al., 2009).

One of the reasons that the application of evidence-based practices is difficult is that organizations and organizational systems are complex and there are many variables that influence the implementation process (Claes et al., 2015; Nilsen, 2015). Because of the uniqueness of organizations and interventions, there will never be universal measurement to assess every facet of implementation (Durlak, 2010). This leaves the field very subjective, meaning that it is up to the researcher to determine how to best assess what implementation steps are necessary to achieve the desired results. It is still not clear how to best monitor implementation or how to best utilize the monitoring to maximize program quality (Domitrovich, Gest, Jones, Gill, & DeRousie, 2010). There are many unknowns pertaining to what to measure, how and when to measure it, and how to capture all of the variables associated with the intervention (Durlak, 2010). More information is needed to clarify which components of implementation are necessary for the desired outcomes, how these components should be assessed, who should conduct the assessments, and when the assessments should be conducted (Durlak, 2010). In addition, the lack of consensus regarding a standardized vocabulary for implementation research adds to the problem (Durlak & DuPre, 2008).

Numerous reviews have investigated the complicated process of implementation and have advanced our understanding of it (Berkel, Mauricio, Schoenfelder, & Sandler, 2011; Durlak, 2010; Durlak & Dupre, 2008; Meyers, Durlak, & Wandersman, 2012). Over the last decade, researchers have tried to establish the theoretical basis of implementation by creating and utilizing different frameworks, models, action plans, and theories (from here, frameworks) that have provided an overview of ideas and practices that shape the implementation process (Nilsen, 2015). Because implementation demands application in real-world settings, rigorous experimental designs are difficult to achieve and case studies have been the primary documentation (Meyers et al., 2012). This type of research has resulted in low external validity or generalizability (M. Burnett, personal communication, 2014; Meyers et al., 2012). In addition, the multitude of frameworks available makes sorting through all of the information daunting to users. Many of the existing frameworks are confusing; some are based on experiences and other on reviews of the literature (Fixsen et al., 2005; Mattox, Hunter, Kilburn, & Wiseman, 2013; Myers et al., 2012; Nilsen, 2015). These frameworks are also visually misleading; their depictions provide a sequential process complete with arrows connecting each step but authors stress that they should not be viewed as linear (Stephenson, Cohen, Montagnet, Bobnis, Gies, & Yeide, 2014). According to Nilsen (2015) and Stephenson et al. (2014) empirical research is needed to explore the application of these frameworks and to determine if their use actually results in more effective implementation.

### **Methodological Challenges**

In addition to the conceptual challenges of implementation research, there are also significant methodological challenges. The two primary methods of assessing implementation are self-reports and independent behavior observations (Durlak & DuPre, 2008; Odom et al.,



2010). First and foremost, this type of data collection is time-consuming and expensive. Generalization is more difficult to capture through self-reports and more frequent observations are required to assess spontaneous behavior by practitioners that is dependent on specific conditions (Domitrovich et al., 2010). There is limited research on how many and what types of assessments are needed to truly capture the implementation process (Domitrovich et al., 2010; Durlak, 2010). In addition, these types of subjective measurements open up the possibility of bias. Self-reports have a tendency to inflate data for fear of negative feedback, making it risky to depend on one person as the sole source of implementation data (Domitrovich et al., 2010). In addition, the use of rating scales and checklists in observations increases the threat of instrumentation if proper training is not done (M. Burnett, personal communication, 2014). Domitrovich et al. (2010) even found that these types of subjective measures had the potential to vary in their validity in the same study (meaning self-reports showed one thing, observations showed the opposite).

Also creating a methodological challenge is the variability in implementation. There are many influences on implementation including practitioner characteristics, context (the surroundings in which something occurs), and organizational culture (Durlak & Dupre, 2008; Nilsen, 2015; Odom et al., 2010). This variability results in many unknown pertaining to how to measure all of the variables associated with an intervention (Durlak, 2010). Not fully capturing all of the variables that are potentially influencing the implementation of an intervention can result in only partial understanding (Nilsen, 2015). Implementation is multifaceted and so complex that achieving a universal framework seems unlikely; however, more research is needed to try and reduce the research-practice gap (Nilsen, 2015).

Implementation research in the field of education, specifically related to curriculum development, is still considered a new, yet important, concept. Past studies have shown that teacher attitudes, beliefs, and perceived self-efficacy can be used as important predictors of their actual classroom practices, or implementation of curriculum (Forbes & Zint, 2010; Hsu, 2004; Plevyak et al., 2001; Zint & Peyton, 2001). Therefore, understanding these variables is an important first step in clarifying which components of program must be implemented to positively impact youth and achieve the desired outcomes of the program (Forbes & Zint, 2010). Research on EE program implementation by formal educators is necessary to try and reduce the research-practice gap and advance the field of EE (Nilsen, 2015).

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## CHAPTER 3: PSYCHOMETRIC PROPERTIES OF THE BELIEFS AND PERCEPTIONS OF ENVIRONMENTAL EDUCATION: A TEACHER SURVEY

### **Abstract**

This study describes the development and initial validation of a tool to measure teachers' beliefs about environmental education (EE), perceptions about their own self-efficacy in implementing EE in their classroom, perceptions about the support they receive in regards to implementing EE in their classroom, the perceived motivators towards EE, and the perceived barriers towards EE. Survey respondents were 21-74 years of age and predominately elementary, female science educators. The internal structure of the instrument was established by using an exploratory factor analysis to extract five latent constructs. The cumulative percentage of variance explained by the constructs was approximately 63% and reliability estimates were .857 and above. Initial assessment of the 31-item survey instrument suggests that it may be a viable tool to assess teachers' beliefs and perceptions of EE. This type of measure can be used to gather input from teachers to better inform EE curricula developers and others concerned with advancing environmental literacy in formal K-12 institutions in the United States.

### **Introduction**

The goal of this study was to provide a comprehensive measure of teachers' beliefs about, perceived self-efficacy for, perceived support for, perceived motivators towards, and perceived barriers towards teaching environmental education (EE) in their classrooms. In 2009 and again in 2013, legislation was proposed that aimed to ensure every student in the United States would achieve basic environmental literacy upon completion of their secondary education (North American Association for Environmental Education (NAAEE), 2014). According to NAAEE (2011), an environmentally literate person is 'one that makes informed decisions

concerning the environment, is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment, and participates in civic life' (Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011, p. 2-5). The hope is that environmental literacy in students will be achieved through a national mandate that aims to develop standards aligned with environmental literacy goals, provides EE-related professional development opportunities for educators, and recommends that each state develop and implement a state-wide environmental literacy plan (NAAEE, 2014). Environmental literacy plans are 'state-specific comprehensive frameworks that support school systems in expanding and improving environmental education programs' (NAAEE, 2014, p. 4). Forty-seven states have completed some, if not all, of the work on their state environmental literacy plan (NAAEE, 2014). However, results from an extensive literature search revealed that only two states, Wisconsin and Washington, conducted state-wide assessments on formal educators prior to the creation of this plan (Ernst, 2007; Lane, Wilke, Champeau, & Sivek, 1994). According to Cronin-Jones (1991), 'researchers have acknowledged the powerful influence that teachers have on the curriculum implementation process' (p. 235). Therefore, before the United States utilize the formal K-12 education system to advance national educational goals related to EE, information must be gathered from teachers to determine the most effective method.

Although research does exist on various concepts related to EE in schools, very few state-wide assessments of any kind, much less on teachers, could be found in the literature. There have been studies done to evaluate the effectiveness of specific EE programs, with the majority of these measuring student outcomes (Cachelin, Paisley, & Blanchard, 2009; D'Agostino, Schwartz, Cimetta, & Welsh, 2007; Dirks & Orvis, 2005; Lott, 2003; Moss, 2003), studies done to determine the barriers teachers face in relation to implementing school-based EE programs

(Ham, Rellergert-Taylor, & Krumpe, 1988; Ham & Sewing, 1988; Simmons, 1998), and studies done to assess teachers' perspectives on pre-service courses or related professional development opportunities (Dillon & Gayford, 1997; McKeown-Ice, 2000). Very few studies were found that examined teacher motivations related to EE (Smith-Sebasto, 2007) and in-service teacher EE self-efficacy studies are even rarer (Moseley, Huss, & Utley, 2010). Those that do exist tend to utilize a survey created by Sia (1992) and albeit an effective tool, this instrument measures pre-service teachers before they actually begin their work the classroom.

To better inform EE-related curricula development and the subsequent implementation of EE in formal K-12 institutions, it is imperative to understand teacher beliefs on the content area and determine what factors could increase their ability to deliver high quality EE in their classrooms. Teacher beliefs refer to the belief that performing a certain behavior will lead to a certain outcome (Shuman & Ham, 1997) and teacher self-efficacy (competency) refers to their perceived self-confidence to perform that certain behavior (Shuman & Ham, 1997). It has been proposed that teachers' beliefs and perceived self-efficacy can be used as important predictors of their classroom practices (Forbes & Zint, 2010; Hsu, 2004; Plevyak, Bendixen-Noe, Henderson, Roth, & Wilke, 2001; Zint & Peyton, 2001). Therefore, even with a national mandate, it will be teachers that decide if they will actually incorporate EE into their classroom and teachers that decide the process they will use to incorporate it. Therefore, it is imperative that teachers' beliefs and perceptions be better understood before a 'state-specific framework' intended to support schools' EE programming efforts is created and mandated by the legislature (NAAEE, 2014). Utilizing a comprehensive survey instrument to learn more about these variables may serve to better inform designers and managers of EE programs and curricula, creators of state-wide environmental literacy plans, and others concerned with utilizing K-12 formal institutions

to advance environmental literacy in youth (Forbes & Zint, 2010; Newhouse, 1990; Pooley & O'Connor, 2000).

The objectives of this study are as follows:

- (1) To examine the factorial structure of the instrument.
- (2) To determine the internal consistency reliability of constructs.

## **Methods**

### **Population and Sample**

The target and accessible population for this study were teachers in Louisiana. Surveys were distributed to a convenience sample of 620 teachers. The age range for respondents was 21 – 74 years of age ( $M = 54$ ;  $S.D. = 7.07$ ). Respondents were predominantly female, elementary, science teachers (Table 3.1). Years of teaching was fairly evenly distributed among established categories provided in the survey.

### **Instrumentation**

An extensive literature search determined that there was not an existing instrument which wholly measured teachers' beliefs, perceived self-efficacy, perceived support, perceived motivators, and perceived barriers related to EE; therefore, an instrument was developed. Survey items were generated utilizing the following guiding questions:

- (1) How much do teachers believe that EE is important (Lane, Wilke, Champeau, & Sivek, 1994)?
- (2) How do teachers perceive their self-efficacy in teaching EE (Lane et al., 1994)?
- (3) How do teachers perceive the support they receive in regards to teaching about the environment?

Table 3.1. Demographic Characteristics of Study Participants.

Gender <sup>a</sup>	<i>n</i>	%
Male	46	12
Female	338	88
Total	384	100
Years Teaching <sup>b</sup>	<i>n</i>	%
1-5 years	68	17.7
6-10 years	76	19.8
11-15 years	74	19.3
16-20 years	66	17.2
21-25 years	50	13.0
Over 25 years	50	13.0
Total	384	100
Grade(s) Taught <sup>c</sup>	<i>n</i>	%
3 <sup>rd</sup>	55	8.9
4 <sup>th</sup>	93	15.0
5 <sup>th</sup>	82	13.2
6 <sup>th</sup>	77	12.4
7 <sup>th</sup>	68	11.0
8 <sup>th</sup>	75	12.1
Grade(s) Taught <sup>c</sup>	<i>n</i>	%
9 <sup>th</sup>	58	9.4
10 <sup>th</sup>	67	10.8
11 <sup>th</sup>	64	10.3
12 <sup>th</sup>	61	9.8
Other <sup>d</sup>	66	10.6
Total	766	123.5
Subject(s) Taught <sup>c</sup>	<i>n</i>	%
Science	265	42.7
Language Arts	127	20.5
Social Studies	135	21.8
Math	138	22.3
Other <sup>d</sup>	88	14.2
Total	753	121.5

<sup>a</sup>236 people did not provide information on gender

<sup>b</sup>236 people did not provide information on years teaching

<sup>c</sup>This was a multi-select item. Percentages do not add up to 100%.

<sup>d</sup> No specification was requested for the “other” response

- (4) To what extent do teachers perceive that external and internal motivators impact teaching about the environment?
- (5) To what extent do teachers perceive that external and internal barriers impact teaching about the environment?

### **Item Generation**

A 40-item survey was generated to address the five desired constructs. The Environmental Education Beliefs construct was used to measure pre-existing teacher beliefs about EE. The Environmental Education Self-Efficacy construct was used to measure teacher perceived self-efficacy for teaching EE. The Environmental Education Support construct was used to measure perceived support for teaching EE. The Environmental Education Motivators construct was used to measure teacher perceived motivators towards teaching EE. The Environmental Education Barriers construct was used to measure teacher perceived barriers towards teaching EE.

Fourteen items were linked to the construct EE Beliefs, seven items to EE Self-Efficacy, seven items to EE Support, eight items to EE Motivators, and three items were linked to EE Barriers. Under the EE Beliefs construct, items 1-4 were created from an inductive reasoning process after review of the extant literature and items 5-14 were adapted from a questionnaire developed by Lane et al. (1994). Under the EE Self-Efficacy construct, items 1-6 were modified from a Sia (1992) questionnaire and item 7 from a study by Ernst (2007). Under the EE Support construct, items 1-2 were modified from the Survey of Instructional Practices for ESL/ELD Teachers Grades K-12 utilized by the University of Wisconsin (2008). Items 3-7 were adapted from the Lane et al. (1994) questionnaire. Items 1-8 under EE Motivators and items 1-3 under EE Barriers were all modified by survey developed by Ernst (2007).



Each of the 40 items utilized Likert's scale. Research has shown that the use of this type of scale increases the reliability of rating scores (Kind, Jones, & Barmby, 2007). The following responses were provided for each statement: 'Strongly Disagree', 'Disagree', 'Neither Agree Nor Disagree', 'Agree', and 'Strongly Agree'.

### **Data Collection**

Data were collected using online survey software, Qualtrics (2015). An email that included a Qualtrics survey link was sent teachers in the spring of 2016. The survey was open for one month. Reminder emails were sent to non-respondents on a weekly basis until the survey closed. In total, 620 Louisiana teachers completed the survey. This study was approved by the Louisiana State University Agricultural Center's Institutional Review Board.

### **Data Analysis**

This study sought to establish initial levels of construct validity of an instrument and to examine scale reliability of that instrument. This was a newly developed instrument with no existing knowledge on associated latent constructs, therefore, an exploratory factor analysis (EFA) was utilized (Tabachnick & Fidell, 2007). An EFA was deemed appropriate through the assessment of sample size, correlations, and multicollinearity. The general practice recommendation of 20-to-1 observation-to-item ratio was used to minimize sampling error (Hair, Black, Babin, & Anderson, 2009) and the range of initial extracted communalities was inspected to ensure a minimum value of 0.5 (MacCullum, Widaman, Zhang, & Hong, 1999). To verify that item correlation was sufficient, the results of the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity were evaluated using the following criteria: (1) a significant p-value for Bartlett's test and (2) a KMO statistic greater than 0.6 (Tabachnick & Fidell, 2007). Multicollinearity was examined by confirming that no values in the correlation matrix equaled or exceeded 0.9 and by demonstrating that the determinant exceeded zero (Field, 2009). Because

the purpose of objective one was to obtain latent constructs, principal axis factoring was selected as the method of extraction (Tabachnick & Fidell, 2007). Internal consistency reliability, the purpose of objective two, was assessed using Cronbach's alpha. SPSS version 23 was utilized in this study.

## **Results**

### **Objective One**

The purpose of objective one was to examine the factorial structure of the instrument to determine if survey items clustered into latent constructs. First, the sample was reviewed to determine if minimum sample size standards were met. For this exploratory portion of the study, the 20-to-1 observation-to-item ratio was in line with the general practice recommendation of 20-to-1 ratio (Hair et al., 2009). A median value of .604 and a mean value of .635, along with communalities ranging from .431 to .878 suggested that the sample size was within the adequate range to reduce sampling error (MacCullum et al., 1999).

The KMO statistic was 0.93 and Bartlett's Test of Sphericity was significant ( $\chi^2 = 14364.37, p < 0.001$ ) which confirmed that item correlations were acceptable for factor analysis (Dziuban & Shirkey, 1974). The correlation matrix did not indicate any issues of item multicollinearity. Item correlations ranged from -.89 to .825 and the determinant was greater than zero, verifying the absence of multicollinearity (Field, 2009). An eigenvalue cut-off value of 1.0 was used to determine the appropriate number of factors. After extraction, five factors that explained 63.50% of the cumulative variance were returned (Table 3.2). Factor 1, EE Beliefs, explained the largest amount of variance.

Table 3.2. Summed Squared Factor Loadings and Total Variance Explained for Factors.

Factor	Eigenvalues	Percentage of Variance
1: EE Beliefs	10.60	34.18
2: EE Self-Efficacy	3.62	11.68
3: EE Support	2.25	7.27
4: EE Motivators	1.84	5.94
5: EE Barriers	1.37	4.42

The original instrument contained 40 items representing teachers' beliefs about, perceived self-efficacy for, perceived support for, perceived motivators towards, and perceived barriers towards EE. Examination of the pattern matrix revealed that nine items contributed little to the factor loadings, less than .50, so they were removed from the construct. The final instrument consisted of 31 items. Factor coefficients of all five factors were high for both the pattern and structure matrices. The items displayed very little cross-loading which inferred a relatively small association between the factors (Table 3.3).

Table 3.3. Exploratory Factor Analysis Pattern and Structure Matrices with Communalities ( $h^2$ ).

Items by Factor	Pattern Matrix	Communalities $h^2$	Structure Matrix
<b>Factor 1: EE Beliefs<sup>ab</sup></b>			
I believe that environmental education helps students develop critical thinking skills.	0.822	0.635	0.795
I believe that environmental education encourages students to take action to resolve environmental issues.	0.750	0.557	0.746
I believe that environmental education focuses on student engagement.	0.780	0.574	0.753
I believe environmental education is interdisciplinary.	0.762	0.561	0.745
I believe that pre-service teachers should be required to take a class on environmental education.	0.655	0.431	0.649
I believe that teachers should provide students with opportunities to gain actual experience in resolving environmental issues.	0.760	0.578	0.756
I believe that teachers should help students develop a set of feelings of concern for the environment.	0.690	0.517	0.711

(Table 3.3 continued)

Items by Factor	Pattern Matrix	Communalities $h^2$	Structure Matrix
I believe that teachers should take time to integrate environmental concepts and issues related to their discipline into their teaching.	0.716	0.624	0.780
It is my responsibility as a teacher to teach environmental education.	0.604	0.620	0.751
<b>Factor 2: EE Self-Efficacy<sup>ac</sup></b>			
I have the necessary skills to teach environmental education.	0.900	0.747	0.863
I am able to answer students' environmental education questions.	0.853	0.740	0.857
I understand environmental education concepts well enough to be effective in teaching environmental education.	0.954	0.878	0.936
I can generally teach environmental education effectively.	0.834	0.769	0.872
I know the steps necessary to teach environmental education concepts effectively.	0.915	0.828	0.910
I teach environmental education as well as I do other subjects.	0.751	0.689	0.824
I have adequate training or professional development for teaching environmental education.	0.487	0.544	0.668
<b>Factor 3: EE Support<sup>ad</sup></b>			
I am supported by colleagues to try out new ideas in teaching environmental education.	0.612	0.446	0.607
I receive support from the administration for teaching environmental education.	0.710	0.534	0.693
I have adequate planning time for teaching environmental education.	0.693	0.547	0.734
I have adequate class time for teaching environmental education.	0.684	0.547	0.729
I have adequate funding for teaching environmental education.	0.782	0.561	0.728
I have adequate resources for teaching environmental education.	0.727	0.561	0.741
I have adequate support from school administration for teaching environmental education.	0.801	0.620	0.787
<b>Factor 4: EE Motivators<sup>ae</sup></b>			
My environmental knowledge influences my decision to teach environmental education.	0.703	0.604	0.769

(Table 3.3 continued)

Items by Factor	Pattern Matrix	Communalities $h^2$	Structure Matrix
My sensitivity to the environment influences my decision to teach environmental education.	0.950	0.834	0.910
My receptiveness to environmental education influences my decision to teach environmental education.	0.880	0.811	0.900
My awareness to student outcomes influences my decision to teach environmental education.	0.652	0.512	0.712
My attitude towards the environment influences my decision to teach environmental education.	0.862	0.746	0.862
<b>Factor 5: EE Barriers<sup>af</sup></b>			
I have concerns regarding student safety when teaching environmental education.	0.907	0.818	0.904
I have concerns regarding school liability when teaching environmental education.	0.901	0.817	0.903
I have concerns regarding classroom management when teaching environmental education.	0.662	0.436	0.658

<sup>a</sup>Mean values based on the 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree

<sup>b</sup> Overall  $M = 4.21$ ;  $SD = 0.62$

<sup>c</sup> Overall  $M = 3.60$ ;  $SD = 0.88$

<sup>d</sup> Overall  $M = 2.98$ ;  $SD = 0.83$

<sup>e</sup> Overall  $M = 3.81$ ;  $SD = 0.80$

<sup>f</sup> Overall  $M = 3.42$ ;  $SD = 0.89$

## Objective Two

Objective two sought to establish the internal consistency reliability of each construct.

The Cronbach's alpha measure of internal consistency values fell within the acceptable interval estimation of reliability (Table 3.4).

Table 3.4. Number of Items and Reliability for Constructs.

Factor	Number of Items	Cronbach's Alpha Reliability
1: EE Beliefs	9	.914
2: EE Self-Efficacy	7	.943
3: EE Support	7	.879
4: EE Motivators	5	.918
5: EE Barriers	3	.857

## Discussion

This study describes the development of a comprehensive instrument to measure teacher beliefs about, perceived self-efficacy for, perceived support for, perceived motivators towards, and perceived barriers towards teaching EE in their classrooms. The final instrument consists of 31 items and five constructs. Specifically, there are nine items in construct one (EE Beliefs), seven items in construct two (EE Self-Efficacy), seven items in construct three (EE Support), five items in construct four (EE Motivators), and three items in construct five (EE Barriers).

The results of this study suggest that this survey is a viable instrument to assess teachers' beliefs and perceptions of EE. The EFA established initial construct validity with five factors extracted to obtain the best possible instrument at the completion of the study. The EFA clearly supported that the 31 items measured five discrete constructs. Sample size, inter-item correlations, variance, and factor loadings were taken into consideration. All were within the accepted guidelines and positively impacted the quality of the solution. Reliability estimates were high with three out of the five falling in the excellent range ( $\alpha \geq 0.9$ ). The remaining two reliability estimates were very close to the exemplary criteria (.857 and .879, respectively) (Robinson, Shaver, & Wrightsman, 1991).

Regarding limitations to the study, the implementation of a convenience sample may limit the generalizability of our findings. This type of nonprobability sampling could have led to under-representation of certain groups (i.e., males) because respondents were predominantly female. The majority of respondents were also elementary science teachers. This supports past findings that the majority of EE is implemented by science teachers (Ham & Sewing, 1988; Littledyke, 1997; McKeown-Ice, 2000) and that EE should begin in the early childhood years (Wilson, 1996). Additional studies with more diverse populations are needed to confirm that these results are generalizable beyond the participants of this study.

## **Conclusions**

This study has implications for the design and implementation of EE in formal K-12 institutions. By developing a deeper understanding of teachers' beliefs and perceptions of EE, we will be able to design EE programs that are desirable to formal educators. Results from this study can serve as a model for conducting research on EE-related beliefs and perceptions from a variety of populations, including non-formal environmental educators and school administrators. The call for every student in the United States to achieve basic environmental literacy upon completion of their secondary education is gaining traction in all 50 states, including Louisiana (NAAEE, 2014). With the associated mandate for every state to create a state-specific environmental literacy plan to effectively implement changes to our existing formal K-12 education system, studies on formal educators such as this will prove to be increasingly valuable to this effort.

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## CHAPTER 4: A COMPARISON OF TEACHERS' BELIEFS AND PERCEPTIONS OF ENVIRONMENTAL EDUCATION

### **Abstract**

This study examined teachers' beliefs about, perceived self-efficacy for, perceived support for, perceived motivators towards, and perceived barriers towards teaching environmental education and compare results between participants and non-participants of a school-based environmental education program. Survey respondents were predominantly elementary, female science teachers aged 21-74 years old. All respondents had positive beliefs about environmental education. Participants and non-participants did differentiate between their perceptions of self-efficacy, support, and motivators, suggesting that teachers with high levels of self-efficacy, more motivators, and perceptions of adequate support would be more likely to participate in a school-based environmental education program. Study results also indicate that a teacher's perceived self-efficacy predicts participation in a school-based environmental education program.

### **Introduction**

#### **Environmental Education**

The origin of environmental education (EE) is linked to the first utilization of nature and outdoor study at school-based camps in the early 1900's (McCrea, 2006; Stevenson, 2007b). The creation of the study of nature was meant to help youth develop an understanding and appreciation of the natural environment through direct observations (Stevenson, 2007b). Later, the conservation movement of the 1930's then introduced concern for the preservation of natural species and areas of natural significance through sound management practices (Stevenson, 2007b). Many consider April 22, 1970, the date of the first Earth Day celebration, as the birthdate of the modern environmental movement (Freeman, 2002). More recently, the passage

of the National Environmental Education Act of 1990 and the subsequent establishment of the Office of Environmental Education in the U.S. Environmental Protection Agency has nurtured the field of EE (McCrea, 2006).

The ultimate goal of EE is changing human behavior that results in a healthful and healing environment (Bennett, 1984; Hungerford & Volk, 1990). The Tbilisi Declaration of 1977, touted as “one of the most important seminal documents in EE” (p.1), defined specific objectives that would help achieve this goal that included increased awareness, sensitivity, and understanding of the environment and environmental issues, increased skills to identify environmental problems, acquisition of feelings of compassion for the environment and the incentive to do something about these feelings, and the encouragement to be actively involved in working towards a resolution (Hungerford & Volk, 1990; UNESCO, 1977). It can be argued that EE is a commitment to activism (Hungerford & Volk, 1990; Lane, Wilke, Champeau, & Sivek, 1995; Stevenson, 2007b). The Tbilisi Declaration (UNESCO, 1977) states:

Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values. (p.24)

EE makes education relevant to real-world concerns and inspires youth to deal with real problems and issues that influence their lives (Bennett, 1984). Effective EE programs should include collaboration, inquiry, critique, and reflection activities that involve critical thinking, contributions to community problems and solutions, and participation in local democracy (Gruenewald & Manteaw, 2007; Stevenson, 2007a; Stevenson, 2007b). The existence of diverse opinions on environmental problems and their solutions are why it is essential that youth learn to examine all perspectives, judge the merit of each stance, form their own opinions, and have the

knowledge to defend them (Stevenson, 2007b). According to a 1995 study by Lane et al., it is the hope that after youth actively participate in EE that they then pursue action to achieve environmental reform and feel confident that they can influence environmental decision-making (Stevenson, 2007b).

Teaching and learning in EE is intended to be highly flexible (Stevenson, 2007b). EE is interdisciplinary and encourages a holistic approach that aims to weave ideas and concepts from all subjects (Lonning, DeFranco, & Weinland, 1998; Moss, 2003). EE focuses on student engagement and is student-led (Stevenson, 2007a). EE activities and assessments allow students the freedom, time, and space to explore the world around them, analyze environmental issues, and practice problem-solving skills (Stevenson, 2007a). The students, not the teachers, must actively engage in higher order critical and complex thinking by participating in more challenging activities than are offered by traditional standard-based curriculum (Stevenson, 2007b).

The purpose of formal education is to transmit basic knowledge, develop basic skills, and to convey a broad understanding of the way society works (Stevenson, 2007b). Current practices utilized in formal K-12 institutions work against the goals of EE by isolating schools from the surrounding community, focusing on structure and order, fragmenting learning into separate time allotments by subject area, utilizing a standards-based curriculum with an emphasis only on core subjects, and encouraging teacher-centered pedagogies that diminish the process of inquiry based learning (Carnoy & Rhoten, 2002; Gruenewald & Manteaw, 2007; Stevenson, 2007a). Instead of engaging in any type of critical and reflective analyses, students are generally asked to regurgitate facts and provide solutions to abstract, theoretical problems (Stevenson, 2007; Stevenson, 2007b). Due to this teaching and learning structure in K-12 institutions, EE struggles

to maintain a presence and establish a standard of practice in formal education because it continues to be marginalized, misunderstood, and even totally neglected (Crohn & Birnbaum, 2010; Gruenewald & Manteaw, 2007; Stevenson, 2007a).

### **Teacher Beliefs and Perceptions**

Past researchers have recognized the importance of teacher input when trying to identify solutions to close the gap between EE and formal education. Studies on teacher beliefs and teacher perceptions are copious throughout EE literature because they have proven to be important predictors of a teacher's classroom practices (Forbes & Zint, 2010; Hsu, 2004; Ko & Lee, 2003; McCaw, 1979; Plevyak, Bendixen-Noe, Henderson, Roth, Wilke, 2001; Zint & Peyton, 2001;). Beliefs are defined as "information that a person accepts to be true" (Koballa & Crawley, 1985, p. 223). In his Theory of Planned Behavior, Ajzen (1985) linked beliefs to behavior using concepts originating from Bandura's Self-Efficacy Theory (1977). Bandura (1977) stated that self-efficacy is an individual's perceived confidence in their capability to perform a certain behavior (Bandura, 1977; Shuman & Ham, 1997). Teacher beliefs and teacher self-efficacy can influence their behavioral intentions and, consequently, their actual practice of teaching (Ko & Lee, 2003). Teachers are the ones to select if and how EE curriculum is utilized in their classroom; therefore, it is imperative that these practitioners be more fully understood.

In his framework, *Elements of Success in Environmental Education*, May (2000) identified 42 variables critical to effective EE. The present study has chosen to look more closely at three: teacher perceived support, perceived motivators, and perceived barriers. Numerous studies have identified these three factors as important to the quality of EE programming (Ham, Rellergert-Taylor, & Krumpe, 1988; Ham & Sewing, 1988). The instrument created by Mullens and Cater (2016) explored them more in-depth. First, looking at

the importance of teacher perceived support, May (2000) identified a “supportive school climate” as a main component of a successful EE program. Most researchers attribute lack of administrative support as the major constraint to EE implementation in schools; however, Grace and Sharp (2000) found that other teachers can also create an unsupportive environment. Mullens and Cater (2016) identified that a supportive climate can come from administration, colleagues, and the overall school environment and can be provided through time, funding, and resources. Now in regards to teacher perceived motivators, research by Ernst (2007 & 2009) indicated that environmental knowledge, environmental skills, environmental attitudes, environmental sensitivity, and environmental receptiveness all influence a teacher’s decision to implement EE. Teachers implementing EE feel personally responsible for the care of the environment (Grace & Sharp, 2000; Tomlins & Froud, 1994), are comfortable with the material (Simmons, 1998), and believe that EE is worth the time and effort (Simmons, 1998). And finally, there is a long list of perceived barriers that a teacher must overcome to be an effective environmental educator. EE is non-traditional and generally involves getting students outdoors; therefore, the barriers identified by Mullens and Cater’s (2016) instrument are associated with safety and, consequently, liability. To provide the freedom of time and space that students need to participate in EE, teachers must believe that they can effectively manage their class, maintain control, and keep their students safe in a non-formal setting (Shuman & Ham, 1997; Simmons, 1998).

Because of the many variables involved, it is still unclear how to design a meaningful and effective school-based EE program that will meet the needs of the teachers and, in turn, get the desired student outcomes. Creative teachers who are passionate about the environment seem to resist the pressures of academic policy and develop pedagogies that utilize EE curriculum



(Gruenewald & Manteaw, 2007). To try and understand while some teachers implement EE and others do not, research should be conducted to explore how those teachers differ. This information will better inform school-based EE program designers and managers and others looking to encourage formal educators to implement their curricula.

The objectives of this study were as follows:

1. To describe Louisiana teachers'
  - a. Beliefs about environmental education (EE Beliefs),
  - b. Perceived self-efficacy for teaching environmental education (EE Self-Efficacy),
  - c. Perceived support for teaching environmental education (EE Support),
  - d. Perceived motivators towards teaching environmental education (EE Motivators),
  - e. Perceived barriers towards teaching environmental education (EE Barriers),
  - f. Years of teaching experience,
  - g. Grades taught, and
  - h. Subjects taught.
2. To compare participants and non-participants of a school-based EE program based on their EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers.
3. To determine if a relationship exists between participation in a school-based EE program and EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers.
4. To determine if a model exists explaining a significant portion of the variance in participation of in a school-based EE program from the following measures: EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers.

## Methods

### Population and Sample

The target and accessible population for this study were teachers in Louisiana. Surveys were distributed to a convenience sample of 620 teachers. The 620 teachers were then separated into those who had participated in a school-based EE program (participants) and those who had not (non-participants). The population consisted of 310 (50.2%) participants and 307 (49.8%) non-participants.

The age range for participants was 21-67 years of age ( $M = 45$ ,  $SD = 12.9$ ) and non-participants was 23-74 years of age ( $M = 56$ ,  $SD = 14.0$ ). Respondents in both groups were predominantly female science teachers. Number of years teaching and grades taught were fairly evenly distributed (Table 4.1).

### Instrumentation

EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers were assessed using a 31-item instrument created by Mullens & Cater (2016). Respondents were provided the following responses for each item: 'Strongly Disagree', 'Disagree', 'Neither Agree Nor Disagree', 'Agree', and 'Strongly Agree'. Specific demographics of the teachers were also collected.

**Environmental Education Beliefs (EE Beliefs).** This 9-item construct was used to measure teacher beliefs about EE.

**Environmental Education Self-Efficacy (EE Self-Efficacy).** This 7-item construct was used to measure teacher perceived self-efficacy for teaching EE.

**Environmental Education Support (EE Support).** This 7-item construct was used to measure perceived support for teaching EE.

Table 4.1 Demographic Characteristics of Study Participants.

Participants			Non-Participants	
Gender <sup>a</sup>	<i>n</i>	%	<i>n</i>	%
Male	14	8.3	32	14.8
Female	154	91.7	184	85.2
Total	169	100	216	100
Years Teaching	<i>n</i>	%	<i>n</i>	%
1-5 years	20	11.9	48	22.2
6-10 years	31	18.5	45	20.8
11-15 years	36	21.4	38	17.6
16-20 years	28	16.7	38	17.6
21-25 years	28	16.7	22	10.2
Over 25 years	25	14.8	25	11.6
Total	168	100	216	100
Grade(s) Taught <sup>b</sup>	<i>n</i>	%	<i>n</i>	%
3 <sup>rd</sup>	29	9.4	26	8.5
4 <sup>th</sup>	51	16.5	42	13.7
5 <sup>th</sup>	45	14.5	37	12.1
6 <sup>th</sup>	40	12.9	37	12.1
7 <sup>th</sup>	28	9.0	40	13.0
8 <sup>th</sup>	37	11.9	38	12.4
9 <sup>th</sup>	26	8.4	32	10.4
10 <sup>th</sup>	27	8.7	40	13.0
11 <sup>th</sup>	23	7.4	41	13.4
12 <sup>th</sup>	21	6.8	40	13.0
Other <sup>c</sup>	16	5.2	50	16.3
Total	343	110.7	423	137.9
Subject(s) Taught <sup>b</sup>	<i>n</i>	%	<i>n</i>	%
Science	131	42.3	134	43.6
Language Arts	56	18.1	71	23.1
Social Studies	66	21.3	69	22.5
Math	56	18.1	82	26.7
Other <sup>c</sup>	34	11.0	54	17.6
Total	343	110.8	410	133.5

## Participation in 4-H YWP

Participants	310	50.2	Non-Participants	307	49.8
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<sup>a</sup>236 respondents did not provide demographic information<sup>b</sup>This was a multi-select item. Percentages do not add up to 100%.<sup>c</sup>No specification was requested for the “other” response.

**Environmental Education Motivators (EE Motivators).** This 5-item construct was used to measure teacher perceived motivators towards teaching EE.

**Environmental Education Barriers (EE Barriers).** This 3-item construct was used to measure teacher perceived barriers towards teaching EE.

### **Data Collection**

Data were collected using online survey software, Qualtrics (2015). An email that included a Qualtrics survey link was sent teachers in the spring of 2016. The survey was open for one month. Reminder emails were sent to non-respondents on a weekly basis until the survey closed. In total, 620 Louisiana teachers completed the survey. This study was approved by the Louisiana State University Agricultural Center's Institutional Review Board.

### **Data Analysis**

Objective one was descriptive in nature and data was summarized using means and standard deviations. Objective two sought to compare participants and non-participants in a school-based EE program based on subscale scores for EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers. Scores were compared using an independent samples t-test. Since five t-tests were planned, an a priori decision was made to set the statistical significance level at 0.01 in order to control the familywise error rate. Objective three sought to determine if a relationship existed between participation in a school-based EE program and EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers. The relationships between these variables were analyzed using a point biserial correlation. Objective four sought to determine if a model existed which explains a significant portion of the variance in participation in a school-based EE program. Logistic regression was used for this analysis. Outliers will be assessed using the following criteria: univariate outliers  $z\text{-score} > 3.29$  ( $p <$

.001) and multivariate outliers using Mahalanobis  $\chi^2 > 18.467$  (4 IVs) ( $p < .001$ ). SPSS version 23 was utilized in this study.

## Results

### Objective One

The purpose of objective one was to describe Louisiana teachers' EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers (Table 4.2). When we compared the variables, we noted that the participants in a school-based EE program had higher mean scores for all five latent constructs than non-participants (Table 4.2). EE Beliefs had the highest mean score for both participants ( $M = 4.27$ ,  $SD = 0.61$ ) and non-participants ( $M = 4.15$ ,  $SD = 0.63$ ). EE Support had the lowest mean score for both participants ( $M = 3.09$ ,  $SD = 0.79$ ) and non-participants ( $M = 2.87$ ,  $SD = 0.86$ ).

Table 4.2. Means and Standard Deviations.

Factor	Participants		Non-Participants	
	$M^a$	$SD$	$M^a$	$SD$
EE Beliefs <sup>b</sup>	4.27	0.61	4.15	0.63
EE Self-Efficacy <sup>c</sup>	3.80	0.80	3.40	0.91
EE Support <sup>d</sup>	3.09	0.79	2.87	0.86
EE Motivators <sup>e</sup>	3.91	0.76	3.72	0.83
EE Barriers <sup>f</sup>	3.46	0.95	3.38	0.83

<sup>a</sup>Mean values based on the 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree.

<sup>b</sup> Overall  $M = 4.21$ ;  $SD = 0.62$

<sup>c</sup> Overall  $M = 3.60$ ;  $SD = 0.88$

<sup>d</sup> Overall  $M = 2.98$ ;  $SD = 0.83$

<sup>e</sup> Overall  $M = 3.81$ ;  $SD = 0.80$

<sup>f</sup> Overall  $M = 3.42$ ;  $SD = 0.89$

### Objective Two

The purpose of objective two was to determine if differences in the means of EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers existed between participants and non-participants of a school-based EE program. Results of an independent samples t-test

revealed statistically significant differences between participants and non-participants on EE Self-Efficacy ( $t_{604} = -5.861$ ;  $p < 0.001$ ), EE Support ( $t_{615} = -3.288$ ;  $p < 0.001$ ), and EE Motivators ( $t_{615} = -2.99$ ;  $p < 0.001$ ). There was no significant difference between participant and non-participant scores on EE Beliefs ( $t_{615} = -2.47$ ;  $p < 0.005$ ) and EE Barriers ( $t_{605} = -1.135$ ;  $p < 0.257$ ).

### **Objective Three**

The purpose of objective three was to determine if a relationship existed between participation in a school-based EE program and EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers. Results of the point biserial correlation indicated a statistically significant relationship between EE participation and EE Self-Efficacy ( $r_{pb} = .230$ ;  $p < 0.01$ ), EE Support ( $r_{pb} = .131$ ;  $p < 0.01$ ), and EE Motivators ( $r_{pb} = .120$ ;  $p < 0.01$ ). These positive correlations indicated an association between higher levels of self-efficacy, more perceived support, and more motivations and a higher participation in a school-based EE program. Analysis also revealed a statistically significant correlation between EE participation and EE Beliefs ( $r_{pb} = .099$ ;  $p < 0.05$ ), meaning favorable beliefs were related to participation in a school-based EE program.

### **Objective Four**

The purpose of objective four was to determine if a statistically significant proportion of the variance in participation in a school-based EE program was explained by the independent variables EE Beliefs, EE Self-Efficacy, EE Support, and EE Motivators. EE Barriers was not correlated; therefore, it was not utilized in the model. Outlier analysis revealed 10 univariate and 21 multivariate outliers. The 21 multivariate outliers included the 10 univariate outliers. Analysis of the data both with and without the outliers revealed no change in the model when the outliers

were removed, thus all data were retained for the analysis. Binary logistic regression analysis indicated good model fit,  $X^2 (df = 4, N = 617) = 33.647, p < 0.001$ , using a deviance criterion, Nagelkerke  $R^2 = 0.071$ , with a 95% confidence interval of .03 to .11 (Cohen, Cohen, West, & Aiken, 2003; Olkin & Finn, 1995; Soper, 2014). Contribution of individual predictors is shown in Table 4.3. EE Self-Efficacy was the only statistically significant predictor of participation as indicated by the Wald criterion,  $p < .001$  (Table 4.3). Binary logistic regression was used to compare the constant only model with the full model. Holding the other independent variables constant, a one unit increase in EE Self-Efficacy improves the odds of participation by 1.73 or 73%.

Table 4.3. Logistic Regression Analysis of Participation in EE as a Function of EE Beliefs, EE Self-Efficacy, EE Support, and EE Motivators.

Variable	<i>B</i>	Wald $X^2$ -test	Odds Ratio	95% Confidence Interval for Odds Ratio	
				<i>Lower</i>	<i>Upper</i>
EE Beliefs	0.054	0.111	1.055	0.768	1.450
EE Self-Efficacy*	0.546	17.556	1.726	1.337	2.228
EE Support	0.023	0.037	1.023	0.810	1.293
EE Motivators	-.044	0.104	0.957	0.730	1.253
Constant	-2.085	11.870	0.124		

\* $p < .001$

## Discussion

The results of this study indicated that Louisiana teachers have positive beliefs about EE. The EE Beliefs construct included items related to student outcomes, teaching methods, and teacher responsibilities (Mullens & Cater, 2016). The lack of significant difference in EE Beliefs between participants and non-participants suggests that all teachers have positive beliefs about EE. These results are consistent with findings from past research that show teachers generally convey positive beliefs about EE and believe that EE should be incorporated into classroom curriculum (Forbes & Davis, 2008; Kim & Fortner, 2006; May, 2000; Plevyak et al., 2001).

Study results also indicated that teachers had neutral, yet slightly unfavorable perceptions about the support that they receive in regards to EE. The EE Support construct contained items that delved into teachers perceptions about support they receive from colleagues and administration, in addition to planning and class time, funding, and resources (Mullens & Cater, 2016). Although there was a statistical difference between the two groups, meaning participants feel more support than non-participants, overall ratings of support were low. This suggests that all teachers perceive a lack of support from their surrounding environment. Emotional support, including affection, advice, reassurance, and encouragement, has been rated by professionals as an essential element of social support (Pines & Aronson, 1981). Past research indicates that support from colleagues and principals predicted teachers' perceptions of self-efficacy (Louis, 1998; Raudenbush, Rowan, & Cheong, 1992; Rosenholtz, 1989). Therefore, a perceived lack of emotional support can lead to a domino effect of low self-efficacy, decreased effort, and important to this study, the decision not to participate a school-based EE program. In addition, teachers' perceptions of an absence of logistical support, such as lack of time, funding, and resources to implement EE curricula could also discourage participation in this type of EE program.

There were statistical differences between participants and non-participants in regards to self-efficacy and motivators. The EE Self-Efficacy construct specifically probed teachers' perceptions of their knowledge and skill level and the EE Motivators construct explored intrinsic motivations, such as teacher sensitivity to and attitude towards the environment (Mullens & Cater, 2016). Participants indicated that they felt more competent and more motivated in teaching EE than non-participants.



This study provides support for the Theory of Planned Behavior (Ajzen, 1985) and Bandura's Self-Efficacy Theory (1977). The Theory of Planned Behavior states a person's beliefs are a contributing factor to a person's behavior. Self-efficacy affects a person's choice of activities, their level of effort, and their persistence in the face of challenges (Bandura & Adams, 1977). Skaalvik and Skaalvik (2010) state that "teacher self-efficacy may be conceptualized as individual teachers' beliefs in their own ability to plan, organize, and carry out activities that are required to attain given educational goals" (p.1059). Teaching is a very demanding occupation. However, teachers who are committed to EE and believe that they have the ability to positively influence student outcomes are more likely to develop strategies to overcome barriers and carry out their desired behavior, i.e. participation in a school-based EE program (Shuman & Ham, 1997).

Limitations to this study involve the implementation of a convenience sample and the utilization of a self-report measure. Convenience sampling may limit the generalizability of the findings. In addition, using a self-report questionnaire presents the risk of respondents providing answers that they deem socially acceptable.

### **Conclusions and Recommendations**

The ultimate goal of all EE programs is to change human behavior to result in positive outcomes on the environment (Bennett, 1984; Hungerford & Volk, 1990). EE occurs in many settings but there are current efforts being made to improve school-based EE programming in the United States; however, it is still unknown how to best design a school-based EE program. This study attempted to determine if there were differences in beliefs and perceptions of those teachers who participate in school-based EE programs and those who do not. Beliefs are an important predictor of behavior, so it is promising to the field of EE that results from this study

show that teachers look upon the subject favorably. Teachers may be more inclined to adopt EE implementation strategies since they already display positive beliefs about it (Ernst, 2009).

Results also show that self-efficacy is integral to teacher participation. The goal of school-based EE programming is students achieving environmental literacy and teachers play a critical role in this process. Teachers are strongly influenced by their own environmental knowledge and skills and often report low self-confidence in their ability to effectively teach EE and support student learning in this area (Ernst, 2012; Forbes & Zint, 2010). Therefore, it is not surprising that a study by a Forbes and Zint (2010) found that respondents who perceived themselves as capable spent more time teaching about the environment. The present study suggests that increasing teacher self-efficacy may increase participation in school-based EE programs. Teacher education is the key to increase teacher self-efficacy. However, one-day workshops on pre-packaged curricula, like those currently utilized by many EE programs, do not provide the necessary foundation that teachers need to gain confidence in effectively teaching EE (Cooper, Wilke, & Champeau, 1989). Environmental issues are complex. Teachers must not simply have a basic awareness and minimal amount of knowledge of these environmental problems but truly appreciate the complexity of these issues and understand their importance to their lives and the lives of their students. In addition, teachers must be knowledgeable of EE pedagogies and confident in their ability to utilize the proper, non-traditional teaching methodology to effectively engage students in EE. Because the cultivation of effective EE teachers is multifaceted, pre-service and in-service teacher education EE courses should be thoroughly examined to ensure that they provide teachers with the necessary time and experience to increase their environmental literacy and fully develop their EE-related competencies. In a 2010 study, Skaalvik & Skaalvik found that teacher self-efficacy was strongly related to their

relationships with parents. Future research should include investigation into external controls, like parental relations, that may affect teacher self-efficacy. In addition, evidence is needed to ascertain what professional development experiences will actually foster teacher self-efficacy.

Overall, study results indicated that teachers with high levels of self-efficacy, more motivators, and perceptions of support would be more likely to participate in a school-based EE program. Future qualitative research may be helpful to more thoroughly explore themes of teachers' beliefs and perceptions of EE. The results from this study suggest that increasing teacher knowledge, skills, and perceived self-efficacy in EE should be a high priority for EE curricula developers and EE program managers.

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## CHAPTER FIVE: DETERMINING IMPLEMENTATION FIDELITY OF A SCHOOL-BASED ENVIRONMENTAL EDUCATION PROGRAM

### **Abstract**

This study examined how a school-based environmental education (EE) program was implemented by teacher participants. Data were collected through a survey of participants in a school-based EE program ( $n = 111$ ). Respondents were 24-67 years of age and predominantly female science teachers. Results revealed variability in implementation of the program's core components. Implementation scores were calculated to assess implementation fidelity to all program components, including core and non-core. Results indicated that most teachers implemented the school-based EE program with moderate fidelity. The results of this study have implications for the evaluation and, subsequently, the improvement of program design and curricula of school-based EE programs.

### **Introduction**

#### **Environmental Literacy**

The term environmental literacy first appeared in 1968 in an article written by Charles E. Roth. Roth, who would later become nationally known as the “Father of Environmental Literacy”, posed the question, “how shall we know the environmentally literate person?” (Roth, 1992, p. 7) Although the term would go on to be heavily utilized in political, scientific, and environmental education (EE) fields, it was not defined on a national level until 2011 with the release of the North American Association of Environmental Education's *Developing a Framework for the Assessment of Environmental Literacy* (Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011). NAAEE (2011) defines an environmentally literate person as “someone who, both individually and together with others, makes informed decisions

concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment; and participates in civic life” (p. 2-3). Even with the lack of a definition from 1968 to 2011, EE programs commonly stated that their primary goal was to develop an environmentally literate citizenry (Hoffman, 1980; Pe’er, Goldman, & Yavetz, 2007; Peri, 1996; Roth, 1992; Roth, 1996). Over time, the concept of environmental literacy has evolved from first being considered a binary designation (environmentally literate or not) to now a continuum of competencies (Roth, 1992). No matter the designation, all related frameworks seem to agree that environmental literacy draws upon four major areas: knowledge, skills, affect, and behavior (Roth, 1992).

The existing formal education system provides opportunities for youth to acquire knowledge and skills that help to shape their behavior (Hungerford & Volk, 1990). Hungerford & Volk state that the “ultimate aim of education is behavior...to develop citizens who will behave in desirable ways” (1990, p. 257). Therefore, it appears that the goals of education and environmental education align. Both desire to educate youth to change their behavior for the betterment of society. Under the current structure of formal K-12 institutions in the United States, teachers seem to be solely responsible for developing youth into literate citizens (Roth, 1992). Consequently, the goal of developing these same youth into environmentally literate citizens also falls on their shoulders. Becoming truly environmentally literate takes time, is highly complex, and interdisciplinary (Hollweg et al., 2011; Roth, 1992). To be effective in developing environmental literacy through EE, teachers must be prepared and supported. The proposed legislation of the No Child Left Inside Act of 2009 is the first indicator that policy makers agree: teachers lack the necessary support to develop environmental literacy in students through the current formal education system. The intent of the No Child Left Inside Act is “to



amend the Elementary and Secondary Education Act (formerly the No Child Left Behind Act) to provide support for environmental literacy programs in public education” (NCLI Coalition, 2014, par. 10). The act calls for the development of EE academic standards and the creation of state-wide environmental literacy plans to advance environmental literacy in the United States (NAAEE, 2014).

#### **4-H Youth Wetlands Education and Outreach Program**

In the state of Louisiana, environmental literacy encompasses coastal restoration and protection (Louisiana Environmental Literacy Plan Subcommittee, 2014). Coastal land loss and water quality issues in fresh and marine ecosystems are at the forefront for Louisiana citizens and educating Louisiana youth on the importance of wetland ecosystems is critical to the survival of the state’s unique lands and waters. The draft version of the Louisiana Environmental Literacy Plan (ELP) states that protecting these “natural resources for current and future generations is the driving force” of the creation of a state ELP (Louisiana Environmental Literacy Plan Subcommittee, 2014, p. 13).

School-based EE programs that specifically focus on wetland ecosystems are rare. Project WET, one of the most widely used EE programs, was created in 1990 on the Montana State University campus (Durney, 1995). This program is one example of a national EE curriculum that touches on wetlands, but its main focus is to emphasize personal responsibility related to water issues (Durney, 1995). Closer to home, Coastal Roots, an international award winning EE program that constructs plant nurseries on school grounds, was initiated by Louisiana State University (LSU) and the Louisiana Sea Grant College Program in 2000 (Karsh, 2005). As the first program of this type and still in existence today, Coastal Roots organizes and

implements hands-on, field-based vegetative plantings for participants but lacks a program-specific curriculum.

The 4-H Youth Wetlands Education and Outreach Program (4-H YWP) is a school-based EE program created in 2007 by two Louisiana state agencies, the Louisiana State University Agricultural Center (LSU AgCenter) and the Louisiana Department of Natural Resources (LDNR). The concept for the program was based on a study by Karsh (2005) that incorporated wetland-themed horticulture lesson plans into Louisiana middle school classrooms. The goal of the 4-H YWP is to increase knowledge and skills of and raise awareness in Louisiana youth about the serious problem of wetland loss and inspire them towards environmental stewardship and activism. The 4-H YWP “immerses students in a concentrated curriculum of wetland-related” lesson plans (Mullens, 2013, par. 1) that were created through a collaborative effort involving program staff, formal educators, non-formal educators, state environmental government agency representatives, wetland scientists, and wildlife biologists. Program lesson plans include activities that encourage collaboration, inquiry, critique, and reflection about Louisiana wetland loss and the effects that this land loss has to the surrounding environment and to society (Chawla & Cushing, 2007; Gruenewald & Manteaw, 2007; Stevenson, 2007a; Stevenson, 2007b). Program activities require that students utilize critical thinking and problem-solving skills to dig deeper into current environmental problems related to wetland ecosystems. The 4-H YWP provides teachers with a place-based curriculum to utilize in their classroom that will relate wetland land loss to students’ lives and result in youth participants acquiring a personal connection to their surrounding environment and taking responsibility for the effect their actions have on that environment (Mullens, 2013).

4-H YWP lesson plans contain itemized material lists, pertinent background information, related vocabulary definitions, and detailed procedural steps for easy implementation. All lessons are designed to be hands-on and can typically be conducted within one class period. Program lessons cross multiple disciplines so any teacher, no matter the subject taught, is able to participate. Lessons are organized by grade and tied to the associated grade's educational state standards. Training is provided to interested participants but not required in order to receive the curriculum. Although certain program practices are encouraged, teacher participants are free to integrate these lesson plans into their classroom curricula how best they see fit. The philosophy of the 4-H YWP has always been to provide ample resources to participants but leave the decisions concerning pedagogy and teaching methodology up to the teachers. However, leaving these decisions up to the teacher can impact program implementation and, consequently, program effectiveness of the 4-H YWP (Barab & Luehmann, 2003; Tarr, Reys, Reys, Chavez, Shih, & Osterlind, 2008). To date, no empirical data have been collected to determine how the curriculum and resources provided by the 4-H YWP are actually implemented by the teacher participants in the classroom.

### **Program Implementation**

According to Durlak & DuPre (2008), implementation refers to “what a program consists of when it is delivered in a particular setting” (p. 329). It is considered anything with potential benefit that pertains to products, programs, theories, policies, or ideas (Durlak, 2010). Implementation is not a static, one-time event, nor is it an all or none phenomenon. It is a non-linear, cyclical process that occurs over time (Durlak, 2010; Durlak & DuPre, 2008; Fixsen, Blase, Naoom, & Wallace, 2009). The aim of proper implementation is simple: to ensure that practitioners use researchers' findings effectively (Fixsen et al., 2009).

Historically, the translation of research into practice was considered a passive process in which it was assumed that information would somehow diffuse to people who would put research innovations into practice (Fixsen et al., 2009; Simpson, 2002). According to this mindset, researchers conducted studies and published their findings, consumers (i.e., managers and practitioners) located and read literature, then proceeded to utilize the newly gained information to improve their work (Fixsen et al., 2009). The entire burden of using scientific evidence in practice primarily fell on practitioners (Wakefield & Kirk, 1996). However, in recent years, people have transformed translation into a more active process (Fixsen et al., 2009) and have moved from a “letting it happen” to a “making it happen” (p. 593) mentality (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004). This means that experts work with organizations, systems, and practitioners in an implementation process to assure benefits to consumers from a high fidelity usage of products and services; they work together to conquer the knowledge application challenge (Fixsen et al., 2009; Proctor & Rosen, 2007).

For practitioners to utilize research advancements effectively, a program must first identify and then integrate the important program parts necessary for program effectiveness, known as the core implementation components (Fixsen et al., 2009). Core components are considered the active ingredients of an intervention or the mechanism of change. Each one should be carefully considered to determine the role it plays in supporting program implementation (Durlak, 2010; Fixsen et al., 2009). Identifying these essential core components informs practitioners about what needs to be replicated precisely, for how long and for what intensity, and what can be adapted or eliminated (Durlak, 2010).

Fidelity has been identified as one of the eight dimensions of program implementation (Durlak & Dupre, 2008). Fidelity is defined as “whether prescribed program components were

delivered as instructed in program protocol” (Berkel, Mauricio, Schoenfelder, & Sandler, 2011, p. 24). The goal of measuring fidelity is to ensure complete and acceptable delivery compared to criteria determined prior to program implementation (Wilson, Griffin, Saunders, Kitzman-Ulrich, Meyers, & Mansard, 2009). Higher implementation fidelity is associated with better program outcomes; therefore, understanding how practitioners implement a program is important to its success (Durlak & Dupre, 2008).

### **Implementation Research**

The field of implementation research has grown but is still not well understood (Peters, Adam, Alonge, Agyepong, & Tran, 2013). Research on implementation is critical to understand and improve interventions; it is also necessary for researchers to be able to establish the external validity of an intervention (Durlak, 2010; Durlak & DuPre, 2008). Implementation research works to improve the translation of research into practice, or science to service (Fixsen et al., 2009; Michie, van Stralen, & West, 2011). The “to” in the science to service represents all of the activities deemed implementation and has been touted as “the missing link” (p. 538) (Fixsen et al., 2009). The need for this type of research was first realized in the 1980’s when the public health sector identified “a large gap between what was known and what was done” (Bhattacharyya, Reeves, & Zwarenstein, 2009, p. 491; Peters et al., 2013). This large gap between knowledge and practice is said to exist due to poor quality guidelines that are not evidence-based and ineffective dissemination of information to practitioners (Bhattacharyya et al., 2009). Currently, there is a large amount of interest in implementation and researchers in multiple disciplines (political science, physical health, education, mental health, marketing, business) are finally recognizing its importance (Durlak, 2010; Fixsen et al., 2009; Peters et al., 2013).

According to Peters et al. (2013), implementation research is “the scientific inquiry into questions concerning the act of carrying an intention into effect” (p. 731). The intent of implementation research is to solve implementation problems by trying to understand what, why, and how interventions work in the “real world” rather than controlling for or removing certain conditions (Peters et al., 2013). The goal is to change the behaviors of practitioners to be as close to behaviors that have been tested and have proven to be effective (Bhattacharyya et al., 2009). Implementation research is not conducted to simply add to the body of knowledge in a specified discipline but is concerned with the consumers of the research, such as managers, policy makers, and practitioners (Peters et al., 2013). Successfully transferring effective programs into real-world settings is a complicated process known as diffusion; a lot can happen between the program design phase of an intervention to what eventually occurs (Durlak, 2010; Durlak & DuPre, 2008). To highlight this point, in their assessment of over 500 implementation studies, Durlak & DuPre (2008) indicated that the process of disseminating effective interventions to an actual population (i.e., real-world settings) usually had unimpressive returns (Durlak & DuPre, 2008).

Powerful benefits can result from effective implementation (Durlak, 2010). In their 2008 study, Durlak and DuPre determined that the level of implementation affected program outcomes. This finding was also supported by a Derzon, Sale, Springer, and Brounstein (2005) study that indicated if implementation problems would be corrected, programs would be 12 times more effective than they were currently. Implementation failure wastes resources and increases the likelihood that programming efforts will not have the desired results (Fagan, Hanson, Hawkins, & Arthur, 2008).

## **Implementation Research in Education**

Implementation research in education first appeared in a study by Berman and McLaughlin (1976) in the 1970's; however, it never gained much traction. As recently as 2009, Warren, Domitrovich, and Greenburg stated that implementation research was emerging as a new and important concept in youth development and curriculum research. Since then, it has been named a priority in early childhood education (Durlak, 2010). The majority of existing literature on educationally-related implementation research highlights pilot and proof-of-concept studies that focus on the impact that a certain curriculum has on the development and knowledge of youth (Looi, Sun, Wu, Seow, Chia, Wong, Soloway, & Norris, 2014). It is rare to read about the progression of how an intervention actually becomes an integral part of classroom practice (Looi et al., 2014). Ben-Peretz (1980) stated that if enough was known about the curriculum implementation process, research findings and developments might actually be utilized by practitioners. That is why it is critical for educators to resist developing new educational programs and instead focus their efforts on what works and how to consistently deliver it (Woolf & Johnson, 2005).

Implementation research in education is critical because even if a curriculum has proven to be valuable, it must be implemented well by practitioners to positively impact youth (Odom, 2009; Odom, Fleming, Diamon, Lieber, Hanson, Butera, Horn, Palmer, & Marquis, 2010). There is a large amount of variability in education interventions because research has shown that teachers do not implement curricula in their classroom in the same way that it was designed to be implemented (Cronin-Jones, 1991). Because of this, Barab and Leuhmann (2003) proposed that program implementation in a classroom actually follows the equation: "Teacher Perceptions + Designed Curriculum + Classroom Culture = Implemented Experience" (p. 462). Numerous

variables impact a teacher's adoption of a new curriculum into their classroom; therefore, effective implementation has to occur on a systematic (micro, meso, and macro) level (Looi et al., 2014).

### **Implementation Research in Environmental Education**

EE in formal school settings is offered in many different forms, such as field trips to outdoor natural areas, lesson integration into existing formal classroom curricula, and hands-on instruction in outdoor classrooms located on school grounds. Because there is no model for teachers to provide EE programs to their students in formal institutions, teachers spend an absorbent amount of time searching for the best techniques (Dirks & Orvis, 2005). Therefore, properly implemented and rigorous implementation research studies are critical to the advancement of EE in formal K-12 institutions (Zint, Dowd, & Covitt, 2011).

Quantitative assessments have been utilized to determine the effects of an EE program on teachers and have measured teacher satisfaction (Dirks & Orvis, 2005), effects of EE teacher in-services to reduce classroom barriers (Lane et al., 1994), and effects of EE teacher in-services on teacher attitudes and behaviors (Bethel, Ellis, & Barufaldi, 1982) but many of these studies have been criticized for their lack of usefulness in actual EE program improvement (Fleming & Easton, 2010). For instance, Hayes (2001) stated that anecdotal reports from teachers indicated that Journeys, an EE program provided in K-12 formal institutions in Utah, is successful but the details on why it is considered successful and what makes it successful are vague. There is a wealth of EE programs available to teachers but despite the widespread use of these programs, such as Project WET, Project Learning Tree, and Junior Master Gardener, very few have been evaluated on their use in the classroom (Dirks & Orvis, 2005).

The objectives of this study were as follows:



1. To describe 4-H YWP participants'
  - a. Beliefs about environmental education (EE Beliefs),
  - b. Perceived self-efficacy for teaching environmental education (EE Self-Efficacy),
  - c. Perceived support towards teaching environmental education (EE Support),
  - d. Perceived motivators towards teaching environmental education (EE Motivators),
  - e. Perceived barriers towards teaching environmental education (EE Barriers).
2. To determine 4-H YWP participants' implementation fidelity to core components.
3. To determine 4-H YWP participants' implementation fidelity to all 4-H YWP components, including core and non-core components and procedures.
4. To determine 4-H YWP participants' utilization of program resources.
5. To determine if a model exists explaining a significant portion of the variance in implementation fidelity of the 4-H YWP by participants from the following measures: EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers.

## **Methods**

### **Population and Sample**

The target and accessible population for this study were participants in the 4-H YWP. Surveys were distributed to a convenience sample of 111 teachers who participated in the 4-H YWP during the 2015-2016 school year. The age range for participants was 24-67 years of age ( $M = 46$ ,  $SD = 11.3$ ). Respondents were predominantly female science teachers (Table 5.1). Grades taught and number of years teaching were fairly evenly distributed.

Table 5.1. Demographic Characteristics of Study Participants.

Gender <sup>a</sup>	<i>n</i>	%
Male	6	5.8
Female	97	94.2
Total	103	100

(Table 5.1 continued)

Years Teaching <sup>a</sup>	<i>n</i>	%
1-5 years	13	12.6
6-10 years	19	18.4
11-15 years	21	20.4
16-20 years	20	19.4
21-25 years	12	11.7
Over 25 years	18	17.5
Total	103	100
Grade(s) Taught <sup>cb</sup>	<i>n</i>	%
Pre-K – 2	2	11.7
3 – 5	45	1.8
Pre-K – 5	1	40.5
6 – 8	27	0.9
Pre-K – 8	5	4.5
9 – 12	10	9.0
Pre-K – 12	8	7.2
Total	98	75.6
Subject(s) Taught <sup>c</sup>	<i>n</i>	%
Science	85	76.6
Language Arts	32	28.8
Social Studies	39	35.1
Math	38	34.2
Other <sup>d</sup>	21	10.0
Total	215	184.7

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<sup>a</sup>8 respondents did not provide this data

<sup>b</sup>13 respondents did not provide this data

<sup>c</sup>This was a multi-select item. Percentages do not add up to 100%.

## Instrumentation

EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers were assessed using a 31-item instrument created by Mullens & Cater (2016). Respondents were provided the following responses for each item: ‘Strongly Disagree’, ‘Disagree’, ‘Neither Agree Nor Disagree’, ‘Agree’, and ‘Strongly Agree’. Specific demographics of the teachers were also collected. Implementation fidelity of 4-H YWP participants was assessed using questions modified from existing surveys found in the literature (Cater, n.d.; Tarr et. al, 2008.).

**Environmental Education Beliefs (EE Beliefs).** This 9-item construct was used to measure teacher beliefs about EE.

**Environmental Education Self-Efficacy (EE Self-Efficacy).** This 7-item construct was used to measure teacher perceived self-efficacy for teaching EE.

**Environmental Education Support (EE Support).** This 7-item construct was used to measure teacher perceived support for teaching EE.

**Environmental Education Motivators (EE Motivators).** This 5-item construct was used to measure teacher perceived motivators towards teaching EE.

**Environmental Education Barriers (EE Barriers).** This 3-item construct was used to measure teacher perceived barriers towards teaching EE.

**Implementation Fidelity.** This 34-item construct was used to measure the extent to which the teacher implemented the program as intended. Five items in this scale consisted of multiple choice questions. Twenty-nine items in this scale consisted of 5-point Likert scale response questions where choices, ‘Never’, ‘Rarely’, ‘Sometimes’, ‘Usually’, and ‘Always’ were provided.

### **Fidelity Index**

Prior to the beginning of this study, program materials were reviewed by youth development experts and program staff and core components and non-core components and procedures of the 4-H YWP were identified. The 34-item Implementation Fidelity construct was used to create a fidelity index for the 4-H YWP that took into account these components and procedures. An overall fidelity score, a quantitative measurement of a teacher’s adherence to program components and procedures, was then calculated for each participant. This score was determined by dividing the number of completed components and procedures by the total

number of components and procedures identified for the 4-H YWP, then converting to a percentage of implementation fidelity. For instance, an implementation fidelity score of 80% indicates that 99 of the 123 core program components and procedures were completed by the teacher. See Table 5.2 for more information on the 4-H YWP Fidelity Index. In addition, specific questions from the 34-item Implementation Fidelity construct were analyzed to determine the degree of teacher adherence to specific program resources.

Table 5.2. 4-H YWP Fidelity Index.

<b>Fidelity Score</b>	<b>Percentage of Implementation Fidelity</b>	<b>Fidelity Rating</b>
98 – 123	80 – 100%	High Fidelity
62 – 97	50 – 79%	Moderate Fidelity
25 – 61	20 – 49%	Low Fidelity
0 – 24	0 – 20%	No Fidelity

## **Data Collection**

Data were collected using online survey software, Qualtrics (2015). An email that included a Qualtrics survey link was sent teachers in the spring of 2016. The survey was open for one month. Reminder emails were sent to non-respondents on a weekly basis until the survey closed. In total, 111 4-H YWP participants completed the survey. This study was approved by the Louisiana State University Agricultural Center’s Institutional Review Board.

## **Data Analysis**

Objective one was descriptive in nature and data were summarized using means and standard deviations. Objectives two, three, and four were also descriptive and data were summarized using frequencies and percent. Objective five sought to determine if a model exists which explains a significant portion of the variance of implementation fidelity of the 4-H YWP. Multiple linear regression was used for this analysis. Outliers were assessed using the following

criteria: univariate outliers  $z$ -score  $> 3.29$  ( $p < .001$ ) and multivariate outliers using Mahalanobis  $\chi^2 > 20.515$  (5 IVs) ( $p < .001$ ) (Tabachnick & Fidell, 2007). Multicollinearity was assessed by confirming that no values in the correlation matrix equaled or exceeded 0.9 and by demonstrating that the determinant exceeded zero (Field, 2009). SPSS version 23 was utilized in this study.

## Results

### Objective One

The purpose of objective one was to describe 4-H YWP participants' EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers. Mean scores for each of the five constructs were computed using the 31-item instrument created by Mullens & Cater (2016). EE Beliefs had the highest mean score of 4.38 ( $SD = 0.57$ ) (Table 5.3). "I believe that environmental education encourages students to take action to resolve environmental issues" garnered the highest agreement ( $n = 72$ ; 65%). Although still favorable, EE Support had the lowest mean score ( $M = 3.30$ ,  $SD = 0.73$ ).

Table 5.3. Means and Standard Deviations.

Factor	<i>M</i>	<i>SD</i>
EE Beliefs	4.38	0.57
EE Self-Efficacy	3.93	0.70
EE Support	3.30	0.73
EE Motivators	4.06	0.71
EE Barriers	3.47	1.00

### Objective Two

The purpose of objective two was to determine 4-H YWP participants' implementation fidelity to core components. The core components for implementation are: 1.) participants teach the 4-H YWP curriculum as a stand-alone, condensed wetlands unit, 2.) participants teach the 4-

H YWP curriculum during a single week, and 3.) participants teach at least five consecutive hours of instruction of the 4-H YWP curriculum. Results show that 29 participants (27%) taught the 4-H YWP curriculum as a stand-alone, condensed wetlands unit, while the remaining 79 participants (73%) used the lesson plans to supplement existing curricula. Twenty-five participants (23%) taught the 4-H YWP curriculum during a single week, while the majority of respondents used lesson plans at varying times throughout the school year ( $n = 83$ , 77%). And, only 25 participants (23%) indicated that they taught five 4-H YWP lessons consecutively. The remaining 83 participants (77%) did not.

### **Objective Three**

The purpose of objective three was to determine 4-H YWP participants' implementation fidelity to all 4-H YWP components, including core and non-core components and procedures. The total number of all program components, including core and non-core components and procedures, was 123. No teachers implemented all of the 4-H YWP components; the highest implementation rate was 93% (115 components implemented). Utilizing the newly created 4-H YWP Fidelity Index (Table 5.2), it was determined that most participants ( $n = 72$ ; 65%) implemented the 4-H YWP with moderate fidelity (Table 5.4).

Table 5.4. Number and Percentages of Implementation Fidelity by 4-H YWP Participants.

	<i>n</i>	%
No Fidelity	4	3.6
Low Fidelity	15	13.5
Moderate Fidelity	72	64.9
High Fidelity	20	18.0

Table 5.5 shows the difference in implementation fidelity based on years of experience as a teacher and then by grade. While teachers with 16-20 years' experience had the largest group of high fidelity implementation, the majority of participants implemented with moderate fidelity

(Table 5.5). In the moderate fidelity group, fairly new teachers with 6-10 years' experience were the most abundant. Implementation fidelity by grade taught showed that 3<sup>rd</sup> – 5<sup>th</sup> grade teachers were the most likely to implement the 4-H YWP with moderate and high fidelity (Table 5.5).

Table 5.5. Number and Percentages of Implementation Fidelity by 4-H YWP Participants' Years of Experience and Grade.

	Low Fidelity		Moderate Fidelity		High Fidelity	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>Years' Experience</b>						
1-5 years	1	1.0	9	8.7	3	2.9
6-10 years	2	1.9	17	16.5	0	0.0
11-15 years	4	3.9	11	10.7	6	5.8
16-20 years	2	1.9	9	8.7	9	8.7
21-25 years	2	1.9	10	9.7	0	0.0
Over 25 years	0	0.0	16	15.5	2	1.9
<b>Grade</b>						
Pre-K – 2	1	0.9	1	0.9	0	0.0
3 – 5	2	2.7	31	27.9	11	9.9
Pre-K – 5	0	0.0	1	0.9	0	0.0
6 – 8	3	2.7	19	17.1	5	4.5
Pre-K – 8	0	0.0	4	3.6	1	0.9
9 – 12	2	1.8	7	6.3	1	0.9
Pre-K – 12	0	0.0	6	5.4	2	1.8

Looking at 4-H YWP procedures, results show that none of the procedures that program staff and youth development experts identified as important to successful program implementation were implemented by participants all of the time (Table 5.6). Few participants indicated that they never implemented some of the procedures; however, the majority stated that they usually implement these recommended procedural steps.

#### **Objective Four**

The purpose of objective four was to determine 4-H YWP participants' utilization of program resources. Data were analyzed to determine how frequently participants utilize resources provided in the 4-H YWP curriculum binder. Results show that all resources, other

Table 5.6. Number and Percentages of 4-H YWP Participants' Implementation of Procedural Steps.

Procedural Step	Never		Rarely		Sometimes		Usually		Always	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Read the lesson plan prior to instruction	3	2.9	9	8.7	31	30.1	59	57.3	0	0.0
Become familiar with background information prior to instruction	3	2.9	9	8.7	31	30.1	60	58.3	0	0.0
Complete the advance preparation steps prior to instruction	3	2.9	13	12.6	44	42.7	40	38.8	0	0.0
Have student materials prepared and organized prior to instruction	2	1.9	4	3.9	33	32.0	62	60.2	0	0.0
Follow the learning objectives provided in the lesson	4	3.9	17	16.5	41	39.8	38	36.9	0	0.0
Paraphrase/highlight the key concepts from the background information with students	6	5.8	16	15.5	42	40.8	39	37.9	0	0.0
Review the vocabulary words with students	2	1.9	10	9.7	42	40.8	49	47.6	0	0.0
Begin the discussion of the topic with open-ended guiding questions	0	0.0	13	12.6	42	40.8	47	45.6	0	0.0
Adhere to the lesson procedure as it is written	18	17.5	32	31.1	35	34.0	15	14.6	0	0.0
Include cooperative learning activities	2	1.9	15	14.6	52	50.5	33	32.0	0	0.0
Have students complete worksheets/assessments	6	5.8	14	13.6	46	44.7	32	31.1	0	0.0
Review key concepts at the end of the lesson	2	1.9	6	5.8	45	43.7	49	47.6	0	0.0
Facilitate a reflection activity at the end of the lesson	8	7.8	19	18.4	49	47.6	26	25.2	0	0.0



than lesson plans, were rarely utilized (Table 5.7). Of the five sections of resources provided in the curriculum binder, the General Wetlands Information for Educators was utilized most frequently.

Table 5.7. Number and Percentages of 4-H YWP Participants' Utilization of Binder Resources.

Binder Resource	Never		Rarely		Sometimes		Usually		Always	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Introduction to Binder	41	38.0	26	24.1	10	9.3	0	0.0	0	0.0
Pre and Post Tests	32	29.6	25	23.1	22	20.4	0	0.0	0	0.0
General Wetlands Information for Educators	36	33.3	42	38.9	23	21.3	0	0.0	0	0.0
Additional Internet Resources	37	34.3	43	39.8	11	10.2	0	0.0	0	0.0
Louisiana Coastal Facts	34	31.5	42	38.9	18	16.7	0	0.0	0	0.0

Looking even more closely at the specific resources provided in 4-H YWP lesson plans, results show that most provided resources are utilized by participants some of the time (Table 5.8). The Background Information appears to be the most heavily utilized resource. Other lesson plan resources frequently used by participants are the Materials List, the Learning Objectives, and the Grade Level Expectation (state standards) List.

Table 5.8. Number and Percentages of 4-H YWP Participants' Utilization of Lesson Plan Resources.

Lesson Plan Resource	Never		Rarely		Sometimes		Usually		Always	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Focus/Overview	10	9.3	25	23.1	44	40.7	21	19.4	0	0.0
Learning Objectives	7	6.5	14	13.0	48	44.4	32	29.6	0	0.0
Materials List	7	6.5	25	23.1	41	38.0	33	30.6	0	0.0
Grade Level Expectation List	9	8.3	20	18.5	39	36.1	32	29.6	0	0.0
Common Core State Standard List	14	13.0	22	20.4	39	36.1	20	18.5	0	0.0
Vocabulary Definitions	7	6.5	19	17.6	52	48.1	29	26.9	0	0.0

(Table 5.8 continued)

Lesson Plan Resource	Never		Rarely		Sometimes		Usually		Always	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Background Information	7	6.5	21	19.4	45	41.7	34	31.5	0	0.0
Advance Preparation	10	9.3	24	22.2	37	34.3	30	27.8	0	0.0
Procedure	6	5.6	22	20.4	44	40.7	31	28.7	0	0.0
Extension Ideas	15	13.9	38	35.2	38	35.2	10	9.3	0	0.0
Student Assessment Worksheets	6	5.6	21	19.4	43	39.8	31	28.7	0	0.0

Due to zero participants indicating that they always adhere to the lesson procedure as it was written (Table 5.6) and zero participants indicating that they always utilize all components of 4-H YWP lesson plans (Table 5.8), it was important to the researcher to look at the issue of lesson adaptation. Of the 111 respondents, 70 participants (65%) indicated that they did not teach the lesson plans exactly the way that they were presented in the 4-H YWP curriculum binder. When asked what changes were generally made, 53 of those 70 participants (90%) responded that they adapted the lesson by shortening it, while only 6 participants (10%) stated that they lengthened the lesson plan.

### Objective Five

The purpose of objective five was to determine if 4-H YWP participants' EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers predicted implementation fidelity. A multiple linear regression was performed. With the use of  $p < .001$  criterion for Mahalanobis distance, two multivariate outliers were identified in the sample. However, they had no effect on the analysis so they were retained in the model. No cases had missing data. Assumptions of normality, linearity, and homoscedasticity of residuals were met. The highest correlation between predictors was .535, indicating that multicollinearity was not an issue. This was further

supported by VIF values which were well below 10 and tolerance statistics above 0.2. The assumption of independence of residuals was met given a Durbin-Watson statistic of 1.74.

Table 5.9 displays the unstandardized regression coefficients (B) and intercept, and the standardized regression coefficients (B) after entry of all independent variables. R was not significantly different from zero,  $R^2 = 0.3$  with 95% confidence limits from .00 to .08,  $F(5, 105) = .722$ ,  $p > .05$ . The adjusted  $R^2$  value of -.013 indicates that the explanatory variables were insignificant. Thus a negligible amount of the variance in implementation fidelity can be explained by these variables.

Table 5.9. Standard Linear Regression for Program Fidelity and Independent Variables.

Model	B	SE B	B	95% CI
(Constant)	46.629	21.595		
EE Beliefs	.568	4.716	.013	[-8.782, 9.919]
EE Self-Efficacy	-.588	4.210	-.017	[-8.936, 7.761]
EE Support	2.90	3.878	.087	[-4.789, 10.590]
EE Motivators	4.303	4.070	.126	[-3.766, 12.372]
EE Barriers	.964	2.375	.039	[-3.746, 5.674]

## Discussion

The fact that participants had both favorable beliefs about EE and positive perceptions of their ability to effectively implement a school-based EE program (EE Self-Efficacy) shows promise for the field of EE. A study by Mullens, Cater, Richardson, and Burnett (2016) revealed that self-efficacy would predict a teacher's participation in a school-based EE program. If teachers feel comfortable with the material and are confident in their ability to lead EE activities, teachers are more likely to choose to participate. The high levels of self-efficacy reported by participants of this study support this finding. Getting teachers to participate is an important first step to an effective school-based EE program, so increasing a teacher's self-efficacy of EE should be extremely important to all EE program managers (Mullens et al., 2016).

Teachers had neutral feelings towards the support that they receive in regards to EE. Mullens & Cater's (2016) EE support construct delved into teachers' feelings on administrative and colleague emotional support, along with logistical support in the form of time, funding, and resources. Funding seemed to be the greatest obstacle to teachers in regards to EE. This is not surprising since numerous studies have indicated that schools and teachers lack the necessary funds to properly implement high quality EE (Ernst, 2007; Ham & Sewing, 1988; Simmons, 1998). The 4-H YWP is free to all participants and, along with the curriculum binder, most supplies needed to implement the lesson plans are also provided in a specially designed kit. Providing program curriculum and supplies at no cost to participants is an important part of the program's design. These results suggest that keeping this program free to participants might influence their decision to implement this school-based EE program.

The core components of the 4-H YWP are: 1. participants teach the 4-H YWP curriculum as a stand-alone, condensed wetlands unit, 2. participants teach the 4-H YWP curriculum during a single week, and 3. participants teach at least five consecutive hours of instruction of 4-H YWP curriculum. The majority of program participants did none of the above during implementation. Most used the lesson plans during various times throughout the school year to supplement existing curricula and only 23% taught five lessons consecutively. This is significant because it indicates that the core components of this school-based EE program may need to be altered.

Utilizing the newly created 4-H YWP Fidelity Index to calculate an overall program fidelity score and an implementation rate for each participant, it was determined that most participants implemented with moderate fidelity (50 – 70%). Comparing implementation rates by years of teaching experience and grade provided interesting supplemental information on participants. Teachers with 16-20 years of experience in the classroom implemented the 4-H

YWP with the highest rate of fidelity. This was unexpected because previous research has found that younger teachers with fewer years of experience were associated with higher fidelity (Wang, Stanton, Deveau, Poitier, Lunn, Koci, Adderley, Kalijee, Marshall, Li, & Rolle, 2015). Teachers in 3<sup>rd</sup> – 5<sup>th</sup> grade classrooms implemented with the highest rates of high and moderate fidelity and 6<sup>th</sup> – 8<sup>th</sup> grade teachers were the second ranked teacher group that implemented with high and moderate fidelity. Under the current program structure, all grades are welcome to participate. Lesson plans are designed for 3<sup>rd</sup> – 12<sup>th</sup> grade students but lower grade level teachers are allowed to participate if they desire to adapt the lesson plans to fit the needs of their audience. The 4-H YWP was based off of a study by Karsh (2005) that confirmed the effectiveness of wetland-related horticultural-based EE lesson plans on middle school students. Because of the results of this study, the 4-H YWP was only offered to 6<sup>th</sup> – 8<sup>th</sup> grade teachers during the initiation year. However after the first year, the program was expanded to encompass 3<sup>rd</sup> – 12<sup>th</sup> grades. Based on the results of implementation rates by teachers in the current study, it appears that the 4-H YWP may not be appropriate for the high school grade level (over 8<sup>th</sup> grade). Further investigation into this possibility is needed before a decision can be made.

Results showed that the highest overall implementation rate by teachers in this study was 93% ( $n = 1$ ). Durlak (2010) stated that “school-based research has never obtained 100% or near perfect implementation” (p. 351) and it is common for there to be implementation variability across teachers. Studies have shown that an implementation rate of 60% or above is associated with positive student outcomes; a general rule of thumb is a 60-80% implementation rate is a good indicator of acceptable fidelity (Durlak & Dupre, 2008). Therefore, an average 59% implementation rate for the 4-H YWP is encouraging. However, a single composite fidelity score may “obscure differences in implementation across providers or program” (“Evaluation

Brief", 2009, p. 1). For instance, two teachers might both receive an implementation rate of 75% but they might have achieved that score by implementing the program in completely different ways. So, it is important that future research determine the exact steps taken by each teacher to accurately determine implementation fidelity. While it is common that fidelity is reported as a percentage of delivered out of total components (Berkel et al., 2011; Dane & Schneider, 1998;), it was important to this study to explore the issue of program adherence more closely.

The 4-H YWP provides a binder to participants that includes an introduction to the overall program and binder resources, pre and post tests for students, general background information on wetlands for the teachers to read and familiarize themselves with the overall concept of wetlands and wetland loss, a list of internet resources for teachers that are interested in digging a little deeper into the issue of wetland loss, and a simple sheet of factual information about Louisiana's coast. Results of this study show that with the exception of program lesson plans, the remaining binder resources are rarely utilized by participants. This is unfortunate because since program inception, a great deal of staff time and effort has been spent updating these resources every year. Lack of utilization of these resources could be due to the fact that many 4-H YWP participants are reoccurring, so they are familiar with the program and the layout of the binder and therefore, they do not feel the need to utilize the introductory materials. Along these same lines, because these teachers have previously taught wetland-related lesson plans, they are not inclined to explore web resources or read the basic wetland fact sheet. The General Wetlands Information appears to be utilized some of the time but results indicate that even this resource could be re-structured or reduced. The acknowledgement that pre and post tests are rarely used is concerning because 4-H YWP stakeholders want evidence of positive student outcomes. Under the current program structure, participants are strongly encouraged, but

not required, to return completed pre and posttests. 4-H YWP lesson plans were based on existing templates. Each lesson plan contains a general overview of the lesson, specific student learning objectives that should be met by the lesson plan, an itemized materials list, a list of the associated state standards, vocabulary definitions, background information on the lesson plan topic, advance procedural steps that the teacher should complete before students arrive, detailed procedural steps to effectively deliver the lesson plan to student participants, extension ideas for those interested a more in-depth investigation into the topic, and gradable student assessment sheets. All of these lesson plan components were utilized by participants just not all of the time. It is promising that the background information was the most heavily utilized component because a significant amount of 4-H YWP staff time and effort is spent to provide teachers with the most up to date, comprehensive, and factual scientific information on the lesson topic. Because teachers have indicated that their lack of knowledge affects their self-efficacy (Sia, 1992), it is important to 4-H YWP staff that the topics presented in the curriculum binder be easily understood and decipherable by teachers with little EE experience.

Teachers indicated that they did not utilize all lesson components all of the time nor did they teach the lesson plans exactly the way they were presented in the curriculum binder. Both of these survey responses are signs of a concept known as lesson adaptation. Adaptation refers to the “nature and degree of any change made to the original program by those delivering the new program” (Durlak, 2010, p. 351). There has been some debate in the literature on the effect of lesson adaption. Adaptation used to be considered “a deviance of program design” (lack of fidelity) (Berkel et al., 2011, p. 27) but further investigation into this concept determined that there are actually positive associations between certain adaptations and program outcomes (Berkel et al., 2011). Because “one size rarely fits all” (Durlak, 2010, p. 351) in most real world

settings, lesson plan adaptation is “frequently inevitable” (Durlak, 2010, p. 351). In the current study, lesson plan adaptation was divided into two categories: shortening or lengthening the lesson plan. The fact that 65% of 4-H YWP participants adapted program lesson plans is not necessarily concerning; flexible programs that can be modified are more likely to be utilized in more settings (Durlak & Dupre, 2008). However, the further acknowledgement that 90% of those participants are adapting the lesson plans by shortening them is a definite cause for concern. As Durlak (2010) stated, “unwise or unnecessary adaptations can limit program impact” (p. 352). If teachers are removing critical components of the lesson plan, that may change the learning objectives and resulting student outcomes. If all teachers that are adapting 4-H YWP lessons are removing the same components, then the current lesson plan template is not meeting the needs of participants. The high rate of lesson adaptation reported in this study indicates that 4-H YWP lesson plans need to be changed.

This study found no relationship between 4-H YWP participants’ EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers and implementation fidelity (Mullens & Cater, 2016). The linear regression analysis showed that the above variables did not explain the variation of teachers’ implementation of this school-based EE program. This is in contrast with results from past research that showed teacher beliefs, self-efficacy, and perceptions exerted a strong influence on implementation (Cotton, 2006; Cronin-Jones, 1991). A larger sample size may be needed to directly evaluate the contributions that these factors have on fidelity. Also important to note, fidelity is only one aspect of program implementation. Limitations to this study do exist. First, the implementation of a convenience sample may limit the generalizability of our findings. Our results are based on questionnaires that required teachers to self-report on their extent of implementation of the 4-H YWP. This type of data is subject to response bias



because it is possible that teachers over reported their level of implementation. Additionally, study respondents are volunteer participants who have oftentimes been found to be overly positive or overly negative on evaluations. And finally, an underestimation of the relationship between the EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers could be due to the small sample size.

### **Conclusions and Recommendations**

This study provides a useful model to assess and analyze the fidelity of implementation of a school-based EE program. This is first study of its kind on the 4-H YWP and comprehensive results revealed that the program needs to go through radical change. Lesson plans need to be shortened, binder resources need to be reduced, and components of the program need to be tested to differentiate between those that are core and those that are not. This study demonstrates the importance of assessing implementation fidelity. All educational programs were once considered new and were created to solve an identified problem. However, after this initial design and creation phase, a program should be monitored and evaluated to determine what is effective and what is not. A program's design can, and should, be changed to meet the needs of participants and obtain the desired results. For instance, the 4-H YWP is ten years old and very little changes have been made since program inception. The results of this study reveal many areas of the program that need adjustments. Determining implementation fidelity is important to the effectiveness and sustainability of a program because outcomes cannot be accurately reported before knowing exactly what is being done to achieve these results. Future research should include observations of participants to validate self-reported information. Low, moderate, and high fidelity teacher groups should be analyzed categorically to determine if outcomes differ between groups. The current study is just a snapshot of program implementation

at one given time. Considering the idea of “program drift” based on the Diffusion of Innovation Theory, future research should look into the possibility that implementation fidelity decreases over time (Rogers, 2003). The existing core components of the 4-H YWP need to be tested to determine what implementation plan achieves the desired student outcomes. With the new realization that the binder resources are rarely utilized, decisions need to be made on what resources should continue to be provided. Fidelity is only one aspect of program implementation; therefore, a more thorough examination into all implementation measures (e.g., reach, dissemination, diffusion) is needed to determine if these variables affect overall implementation of this school-based EE program. Because only a negligible amount of the variance in implementation fidelity was explained by EE Beliefs, EE Self-Efficacy, EE Support, EE Motivators, and EE Barriers, more variables need to be observed to determine those that predict implementation fidelity.

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## FINAL CONCLUSIONS

If efforts to improve EE in formal K-12 institutions in the United States are to succeed, legislators, school administrators, and educators (formal and non-formal) must jointly make the decisions that will determine how to best achieve reform of the current educational system to include EE-related topics. The results of this study show that teachers have positive beliefs about EE, meaning there is an existing foundation that teachers believe educating youth to be environmental activists is important. Teachers may only need more confidence in their ability to effectively teach EE to drive them participate and successfully implement a school-based EE program. Steps to increase teacher self-efficacy should be made by EE curricula developers and program managers because it appears self-efficacy is vital to a program's sustainability. School administrators should be included in the discussion on how to increase teacher self-efficacy and how to provide teachers with the emotional and logistical support that they need and desire.

Implementation research is a fairly new concept in the field of education and EE. The design of many school-based EE programs provides teachers with flexibility to decide how to implement the curriculum to best fit the needs of their students. Because teachers decide how they will implement the curriculum in their classroom, variability is basically inevitable. That is why implementation research into these types of programs is vital. Before school-based EE programs can assert that participation results in positive students outcomes, it must be determined what students are actually experiencing, or what is being implemented by the teacher. Successful and effective school-based EE programs can only be replicated if the exact implementation process is known.

Appendix A Louisiana State University Agricultural Center  
IRB for Protection of Human Subjects Approval Letter



LSU AgCenter Institutional Review Board (IRB)  
Dr. Michael J. Keenan, Chair  
School of Human Ecology  
209 Knapp Hall  
225-578-1708  
mkeen@agctr.lsu.edu

**Application for Exemption from Institutional Oversight**

All research projects using living humans as subjects, or samples or data obtained from humans must be approved or exempted in advance by the LSU AgCenter IRB. This form helps the principal investigator determine if a project may be exempted, and is used to request an exemption.

- Applicant, please fill out the application in its entirety and include the completed application as well as parts A-E, listed below, when submitting to the LSU AgCenter IRB. Once the application is completed, please submit the original and one copy to the chair, Dr. Michael J. Keenan, in 209 Knapp Hall.
- A Complete Application Includes All of the Following:
  - (A) The original and a copy of this completed form and a copy of parts B through E.
  - (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1 & 2)
  - (C) Copies of all instruments and all recruitment material to be used.
    - If this proposal is part of a grant proposal, include a copy of the proposal.
  - (D) The consent form you will use in the study (see part 3 for more information)
  - (E) Beginning January 1, 2009: Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing and handling data, unless already on file with the LSU AgCenter IRB.  
Training link: (<http://grants.nih.gov/grants/policy/hs/training.htm>)

1) Principal Investigator: Ashley W. Mullens Rank: Student Student? YES

Dept: AEEE Ph: 225-578-2196 E-mail: awmullens@agcenter.lsu.edu

2) Co-Investigator(s): please include department, rank, phone and e-mail for each

- If student as principal or co-investigator(s), please identify and name supervising professor in this space

Dr. Melissa Cater, Assistant Professor, AEEE, 225-578-2903, [mcater@agcenter.lsu.edu](mailto:mcater@agcenter.lsu.edu)

3) Project Title: The Effect of Teacher Beliefs, Attitudes, and Self-efficacy on Environmental Education Program Implementation

4) Grant Proposal?(yes or no) No If Yes, Proposal Number and funding Agency \_\_\_\_\_  
Also, if Yes, either: this application completely matches the scope of work in the grant Y/N \_\_\_\_\_

OR  
more IRB applications will be filed later Y/N \_\_\_\_\_

5) Subject pool (e.g. Nutrition Students): 3<sup>rd</sup>-12<sup>th</sup> grade teachers in public schools in Louisiana

- Circle any "vulnerable populations" to be used: (children < 18, the mentally impaired, pregnant women, the aged, other). Projects with incarcerated persons cannot be exempted.

6) PI signature: [Signature] \*\*Date 4-21-2016 (no per signatures)

\*\*I certify that my responses are accurate and complete. If the project scope or design is later changed I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU-AgCenter institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all

consent forms at the LSU AgCenter for three years after completion of the study. If I leave the LSU AgCenter before that time the consent forms should be preserved in the Departmental Office.

Committee Action: Exempted ☒ Not Exempted ☐

IRB#

HF16-7

Reviewer

Michael Keenan

Signature

Michael Keenan

Date

4-21-2016

### Part 1: Determination of "Research" and Potential for Risk

- This section determines whether the project meets the Department of Health and Human Services (HHS) definition of research involving human subjects, and if not, whether it nevertheless presents more than "minimal risk" to human subjects that makes IRB review prudent and necessary.

**1. Is the project involving human subjects a systematic investigation, including research, development, testing, or evaluation, designed to develop and contribute to generalizable knowledge?**

(Note some instructional development and service programs will include a "research" component that may fall within HHS' definition of human subject research)

☒ Yes

☐ No

**2. Does the project present physical, psychological, social or legal risks to the participants reasonably expected to exceed those risks normally experienced in daily life or in routine physical or psychological examination or testing? You must consider the consequences if individual data inadvertently become public.**

☐ Yes Stop. This research cannot be exempted—submit application for full IRB review.

☒ No Continue to see if research can be exempted from IRB oversight.

**3. Are any of your subjects incarcerated?**

☐ Yes Stop. This research cannot be exempted—submit application for full IRB review.

☒ No Continue to see if research can be exempted from IRB oversight.

**4. Are you obtaining any health information from a health care provider that contains any of the identifiers listed below?**

A. Names

B. Address: street address, city, county, precinct, ZIP code, and their equivalent geocodes. Exception for ZIP codes: the initial three digits of the ZIP code may be



## **Beliefs, Attitudes and Self Efficacy**

Q1.

Study Title: The Effect of Teacher Beliefs, Attitudes, and Self-efficacy on Environmental Education Program Implementation

Performance Site: Louisiana State University Agricultural Center

Investigators: The following investigators are available for questions about this study on M-F, 8:00 a.m. - 4:30 p.m.

Ashley Mullens, 225-578-2196

Dr. Melissa Cater, 225-578-2903

Purpose of the Study: The purpose of this research project is to determine if relationships exist between teacher beliefs and attitudes about environmental education, teacher perceived self-efficacy towards teaching environmental education, and teacher implementation of an environmental education program, the 4-H Youth Wetlands Program.

Subject Inclusion: Individuals between the ages of 18 and 65 who do not report psychological or neurological conditions. To participate in this study, you must meet the requirements of both the inclusion and the exclusion criteria.

Number of Subjects: 700

Benefits: There are no anticipated direct benefits to subjects participating in this study.

Risks: There are no anticipated risks to subjects participating in this study other than those encountered in daily life.

Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: Results of this study may be published, but no names or identifying information will be included in the publication. Subject Identity will remain confidential unless disclosure is required by law.

Signatures: This study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Dr. Phillip Elzer, Institutional Review Board, 225-578-4182 or [Elzer@agcenter.lsu.edu](mailto:Elzer@agcenter.lsu.edu). I agree to participate in this study described above.

- ☐ Yes. Please take me to the survey.
- ☐ No. I do not wish to participate.

Q2.

Please indicate your level of agreement or disagreement with each of the statements below:

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I believe that environmental education is a priority in the K-12 school system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that environmental education helps students develop critical thinking skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that environmental education encourages students to take action to resolve environmental issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that environmental education focuses on student engagement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe environmental education is interdisciplinary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that pre-service teachers should be required to take a class on environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I believe that teachers should provide students with opportunities to gain actual experience in resolving environmental issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that teachers should help students develop a set of feelings of concern for the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that teachers should take time to integrate environmental concepts and issues related to their discipline into their teaching	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is my responsibility as a teacher to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am supported by colleagues to try out new ideas in teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I receive support from the administration for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have many opportunities to learn new things about teaching environmental education in my present job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.

Please indicate your level of agreement or disagreement with each of the statements below:

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I have the necessary skills to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to answer students' environmental education questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I understand environmental education concepts well enough to be effective in teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can generally teach environmental education effectively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know the steps necessary to teach environmental education concepts effectively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I teach environmental education as well as I do other subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q4.

Do you teach Environmental Education in your classroom?

- ☐ Yes
- ☐ No
- ☐ Not sure

Q5.

Please indicate your level of agreement or disagreement with each of the statements below:

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
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I have adequate planning time for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have adequate class time for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have adequate funding for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have adequate resources for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have adequate support from school administration for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have adequate training or professional development for teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel the emphasis on state standardized testing is a barrier to teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have concerns regarding student safety when teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have concerns regarding school liability when teaching environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



I have concerns regarding classroom management when teaching environmental education

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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I feel environmental education is appropriate for the grade level that I teach

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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I feel environmental education is related to the subject that I teach

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q6.

Please indicate your level of agreement or disagreement with each of the statements below:

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
My environmental knowledge influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My sensitivity to the environment influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My receptiveness to environmental education influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My awareness of student outcomes influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My attitude towards the environment influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
My school climate (administration and other teachers) influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My training in environmental content influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My professional development related to environmental education influences my decision to teach environmental education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### 4-H YWP Implementation

Q7. Have you ever participated in the 4-H Youth Wetlands Program (4-H YWP)?

- ☐ Yes
- ☐ No

Q8. In what school years have you participated in the 4-H YWP (check all that apply)?

- ☐ 2007-2008
- ☐ 2008-2009
- ☐ 2009-2010
- ☐ 2010-2011
- ☐ 2011-2012
- ☐ 2012-2013
- ☐ 2013-2014
- ☐ 2014-2015
- ☐ 2015-2016

Q9.

Did you utilize 4-H YWP lessons in your classroom during the 2015-2016 school year?

- ☐ Yes
- ☐ No

Q10.

During the 2015-2016 school year, which 4-H YWP curriculum binder did you utilize with your class?

- ☐ Louisiana Wetland Animals Binder
- ☐ Coastal Louisiana Binder
- ☐ Both
- ☐ Other (please include year of 4-H YWP binder)

Q11. In the Louisiana Wetland Animals binder, what lessons did you utilize during the 2015-2016 school year? Check all that apply.

- ☐ Against All Odds: The Pelican Story
- ☐ An Arthropod Adventure
- ☐ Crawfish 101
- ☐ Crawfish Economics
- ☐ Hatcheries and Habitats
- ☐ Investigating Insects
- ☐ No Bones About it
- ☐ Squirrels
- ☐ An Owl with a Bone to Pick
- ☐ An Arthropod Analysis
- ☐ Busy as a Beaver
- ☐ Dabblers or Divers
- ☐ Gulf Shrimp
- ☐ Symbiotic Relationships
- ☐ Weigh-in on Louisiana Woodpeckers

- ☐ Biodiversity Blackjack
- ☐ Gone, Going, Gone
- ☐ Home is Where the Habitat Is
- ☐ Litter Critters
- ☐ Pearlshell Problems
- ☐ Louisiana's Most Endangered

Q12. In the Coastal Louisiana binder, what lessons did you utilize during the 2015-2016 school year? Check all that apply.

- ☐ Graffiti Timeline of Louisiana's Coast
- ☐ Hunting for Facts in CPRA's Coastal Master Plan
- ☐ Louisiana's Lines of Defense
- ☐ Scrapbooking Louisiana's Barrier Islands
- ☐ Rebuilding Louisiana - A Success Story
- ☐ Coastal Louisiana - A Timeline
- ☐ CPRA's 2012 Master Plan Exploration
- ☐ The McCall Marsh Master Plan
- ☐ A Historical Dialogue on Louisiana's Coast
- ☐ Coastal Connections to Louisiana's Ports
- ☐ A Timeline of Louisiana's Coast
- ☐ Louisiana's Master Plan for the Coast
- ☐ Where are your Wetlands?
- ☐ Sediment Diversions: Digging into the Data
- ☐ Models and Maps of Coastal Marsh Habitats

Q13. In the Coastal Louisiana and Louisiana Wetland Animals binders, what lessons did you utilize during the 2015-2016 school year? Check all that apply.

- ☐ Against All Odds: The Pelican Story
- ☐ An Arthropod Adventure
- ☐ Crawfish 101
- ☐ Crawfish Economics

- ☐ Hatcheries and Habitats
- ☐ Investigating Insects
- ☐ No Bones About it
- ☐ Squirrels
- ☐ An Owl with a Bone to Pick
- ☐ An Arthropod Analysis
- ☐ Busy as a Beaver
- ☐ Dabblers or Divers
- ☐ Gulf Shrimp
- ☐ Symbiotic Relationships
- ☐ Weigh-in on Louisiana Woodpeckers
- ☐ Biodiversity Blackjack
- ☐ Gone, Going, Gone
- ☐ Home is Where the Habitat Is
- ☐ Litter Critters
- ☐ Pearlshell Problems
- ☐ Louisiana's Most Endangered
- ☐ Graffiti Timeline of Louisiana's Coast
- ☐ Hunting for Facts in CPRA's Coastal Master Plan
- ☐ Louisiana's Lines of Defense
- ☐ Scrapbooking Louisiana's Barrier Islands
- ☐ Rebuilding Louisiana - A Success Story
- ☐ Coastal Louisiana - A Timeline
- ☐ CPRA's 2012 Master Plan Exploration
- ☐ The McCall Marsh Master Plan
- ☐ A Historical Dialogue on Louisiana's Coast
- ☐ Coastal Connections to Louisiana's Ports
- ☐ A Timeline of Louisiana's Coast
- ☐ Louisiana's Master Plan for the Coast
- ☐ Where are your Wetlands?
- ☐ Sediment Diversions: Digging into Data
- ☐ Models and Map of Coastal Marsh Habitats

Q14.

During the 2015-2016 school year, which of the following best describes **WHEN** you utilized 4-H YWP lessons in your classroom?

- ☐ Varying times throughout the year
- ☐ Single week, during Youth Wetlands Week
- ☐ Single week, not during Youth Wetlands Week
- ☐ Other

Q15.

Rate how frequently you used each of the following sections in the 4-H YWP curriculum binder?

	Never	Rarely	Sometimes	Usually	Always
Introduction to Binder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pre and Post Tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
General Wetlands Information for Educators	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Internet Resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CPRA Louisiana Coastal Facts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q16.

Rate how frequently you used each of the following components of a 4-H YWP lesson plan.

	Never	Rarely	Sometimes	Usually	Always
Focus/Overviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning Objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materials List	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grade Level Expectation List	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Common Core State Standard List	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vocabulary Definitions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Background Information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advance Preparation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Never	Rarely	Sometimes	Usually	Always
Procedure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extension Ideas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Student Assessment Worksheets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17.

During the 2015-2016 school year, which of the following best describes HOW you utilized the 4-H YWP lessons in your classroom?

- ☐ Single condensed unit
- ☐ Supplement to existing lessons
- ☐ Other

Q18. During the 2015-2016, did you teach five 4-H YWP lessons consecutively?

- ☐ Yes
- ☐ No

Q19.

Did you teach the lesson plans exactly the way that they were presented in the 4-H YWP curriculum binder?

- ☐ Yes
- ☐ No

Q20.

What are the changes you generally made to the 4-H YWP lesson plans?

- ☐ Shortened overall lesson plan. Please give a brief description of what you removed:

- ☐ Lengthened overall lesson plan. Please give a brief description of what you added:

- ☐ Other. Please give a brief description of what you changed:

Q21. Please indicate how frequently you do each of the following:

	Never	Rarely	Sometimes	Usually	Always
Read the lesson plan prior to instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Become familiar with background information prior to instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complete the advance preparation steps prior to instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have student materials prepared and organized prior to instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Follow the learning objectives provided in the lesson	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paraphrase/highlight the key concepts from the background information with students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Review vocabulary words with students	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Begin the discussion of the topic with the open-ended guiding questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adhere to lesson procedure as it is written	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Include cooperative learning activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have students complete worksheets/assessments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Review key concepts at end of the lesson	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facilitate a reflection activity at the end of the lesson	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q22. Approximately how many students were taught from the 4-H YWP curriculum in the 2015-2016 school year?

Q23. With what grade(s) did you utilize 4-H YWP lessons during the 2015-2016 school year?  
Check all that apply.

☐ 3rd



- ☐ 4th
- ☐ 5th
- ☐ 6th
- ☐ 7th
- ☐ 8th
- ☐ 9th
- ☐ 10th
- ☐ 11th
- ☐ 12th
- ☐ Other

Q24. How old are you?

Q25. What is your gender?

- ☐ Male
- ☐ Female

Q26.

In total, how many years have you been teaching (include this year)?

- ☐ 1-5 years
- ☐ 6-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ 21-25 years
- ☐ Over 25 years

Q27. What grade(s) do you currently teach (check all that apply)?

- ☐ 3rd
- ☐ 4th

- ☐ 5th
- ☐ 6th
- ☐ 7th
- ☐ 8th
- ☐ 9th
- ☐ 10th
- ☐ 11th
- ☐ 12th
- ☐ Other

Q28. In what setting do you currently teach?

- ☐ Public School
- ☐ Private School
- ☐ Charter School
- ☐ Home School
- ☐ Non-formal Educator
- ☐ Other

Q29. Where is your school located?

- ☐ Urban (population of 50,000 or more people)
- ☐ Rural (all population, housing, and territory not included within an urban area)

Q30. What parish is your school located?

Q31. What subject(s) do you currently teach (check all that apply)?

- ☐ Science
- ☐ Language Arts
- ☐ Social Studies

☐ Math

☐ Other

Q32.

How many students do you teach per year?

- ☐ 0-10
- ☐ 11-30
- ☐ 31-60
- ☐ 61-100
- ☐ 101-200
- ☐ Greater than 200

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## VITA

Ashley Wilson Mullens was born to Sandy F. Currier and Thomas M. Wilson III.

Ashley, along with her two older sisters, Doughty W. Varnedoe and Courtney Wilson, was raised in New Roads, Louisiana. Ashley is married to David S. Mullens II and they have two children, a son, Wyatt T. Mullens, and, a daughter, Graham L. Mullens. Ashley, David, and their children reside in St. Francisville, Louisiana. Ashley has a Bachelor of Science degree in wildlife management from Louisiana State University and a Master of Science degree in agronomy from Louisiana State University. Mrs. Mullens has been employed with the Louisiana State University Agricultural Center 4-H Youth Development Department since 2008 where she serves as the Manager of the 4-H Youth Wetlands Education and Outreach Program. Ashley is a candidate to receive her Doctorate of Philosophy degree in December 2016.