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The Relationship Between Knowledge, Attitudes, And Behaviors Regarding Eco-Justice Issues Among Middle And High School Students In Eco- Schools In Puerto Rico

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**THE RELATIONSHIP BETWEEN KNOWLEDGE, ATTITUDES, AND BEHAVIORS
REGARDING ECO-JUSTICE ISSUES AMONG MIDDLE AND HIGH SCHOOL
STUDENTS IN ECO-SCHOOLS IN PUERTO RICO**

by

ELSIE AQUINO

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2018

MAJOR: CURRICULUM & INSTRUCTION

Approved By:

Advisor

Date

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DEDICATION

I dedicate my dissertation work to family and friends. Special thanks to my loving Parents, Rafael Aquino Pérez, María Díaz Tirado, and Virginia González Pagán, and my grandparents, Donato and Santos Aquino-Pérez and Genoveva Pagán, whose words of knowledge always resonate in the walls of my mind.

Thank you to my daughters who have offered me the joy of walking with them through their journey and have taught me how to see life in a different way. To my granddaughter Amalia Rose from whom I learned how important it is to see everything around me. To my other granddaughter Sara Elizabeth who has brought a new ray of sun into my life. To my sister Nydia Meléndez Díaz and my brothers José Rafael Meléndez and Rafael Aquino whose company I always have, even when they are not around.

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CHAPTER 1: INTRODUCTION

Background of the Study

The conservation, preservation, and protection of the environment are responsibilities that must be globally shared by human beings to “meet the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development [WCED], 1987, p. 43). When citizens acquire the knowledge and skills needed to become agents of change, the lack of interconnectedness – a relationship to nature as one of dominion and control – that presently exists between humans and nature might subside (Winograd, 2016). Through the re-orientation of the present educational system and the development of curricula that addresses the present day environmental crisis, citizens can become aware of the need to work together towards sustainability (The United Nations Decade of Education for Sustainable Development [UNDESD], 2005-2014).

To this end, ecological sustainability may be achieved by integrating the Guidelines of the Eco-Schools Program into the curriculum. This program developed in 1992, was a response to the need to involve young people in environmental projects at the local level as identified at the United Nations Conference on Environment and Development (UNCED). It was launched in 1994 in Denmark, Germany, Greece and the United Kingdom with the support of the European Commission. When the Foundation for Environmental Education became global in 2001, countries outside of Europe began joining the Eco-Schools Program. South Africa was the first country to do so. In 2003, the Eco-Schools Program was identified by the United Nations Environmental Program (UNEP), as a model initiative for Education for Sustainable Development [ESD] (FEE – UNEP MoU, 2003).

The term ESD is used internationally and by the United Nations to describe the practice of teaching for sustainability while simultaneously maintaining diversity and productivity of biological systems for the foreseeable future. These schools seek to re-orient existing curricula around sustainable development themes, and work in collaboration with the community to develop projects to improve their environment.

This initiative with its focus on Eco-Justice aims to empower students to be the agents of change that the sustainable world needs by engaging them in fun, action-oriented, and socially responsible learning (Vilches-Norat, 2015). ESD works towards teaching students that their knowledge, behaviors, and attitudes towards reconnecting with the entire natural world are important, to work towards nurturing a just planet for present and future generations. (Berrios Cruz & Rodríguez Fernós, 2011; Henderson & Milstein, 2007; Martusewicz, Edmunson, & Lupinacci, 2015; Winograd, 2016). In schools that follow the Eco-Schools Programs' Guidelines, the pedagogy supplements the Common Core Standards with a curriculum focused on teaching students how to be critical thinkers prepared to address real-world problems (Winograd, 2016). Therefore, ESD may be part of the solution for the present ecological crisis, as well as for developing critical thinkers who know how to make informed decision in becoming the agents of change society needs.

At the heart of ESD is the concept of Eco-Justice and Eco-Justice Education, which is intrinsically connected to the broader idea of social justice and broadens its scope to include the natural world as a vital human concern. Building on the work of Bowers (1997, 2001), Martusewicz et al. (2015) use these six elements to define Eco-Justice:

1. Cultural assumptions that undermine local and global ecosystems essential to life.

2. Entrenched patterns of domination that define people of color, women, the poor, and other groups as inferior and less worthy of life.
3. Globalization of modernist thinking that have led to exploitation of natural and human resources.
4. Cultural and environmental commons—the necessary interdependent relationship of humans with the land, air, water, and other species with whom we share this planet.
5. Emphasis on strong Earth democracies, with decisions made by the people who are most affected by them
6. Pedagogy and curriculum development that encourages students to identify effects of social and ecological problems where they live (pp. 12,13)

While Martusewicz et al. (2015) note that these elements are interrelated, this study focuses on number six. This focus on Eco-Justice distinguishes ESD from its predecessor, Environmental Education (EE), which emphasized helping individuals explore environmental issues, engage in problem solving, take action to improve the environment, and contributed to the development of a deeper understanding of environmental issues. Moreover, by seeking to foster critical thinking skills, EE enabled individuals to acquire skills to make informed and responsible decisions (UNESCO, 1978). However, EE's focus on the environment was almost incidental – another subject could be substituted and yield similar pedagogical benefits. In contrast, an Eco-Justice approach makes the environment inseparable by examining the way cultural behaviors and belief structures are taken-for-granted and assumptions are made about the world. (Martusewicz et al., 2015).

Just as Eco-Justice Education is not simply educating students about the environment, a pedagogy concerned with Eco-Justice, like ESD, cannot be an add-on component to an existing curriculum. It must be integrated across the entire curriculum (UNESCO, 2005). The consequence of a focused, carefully designed curriculum inculcating an Eco-Justice mindset was demonstrated by a study conducted in Dutch schools without a formal Eco-Justice curriculum and where environmental topics were not a major feature of their education (Kulemeier, Van Den Bergh, & Lagerweij, 1999). The Dutch National Assessment Program measured environmental knowledge, environmental attitudes, and environmentally responsible behavior with a nationwide sample of more than 9,000 students. Fifty-seven percent of the 9th-grade students had a (very) positive attitude toward the environment, and 35% were prepared to take extra pains or to make financial sacrifices for the environment. However, the students' knowledge about environmental problems was fragmentary and often incorrect. Similarly, environmentally responsible behavior of many students was inadequate, as shown by the weak relationship between environmental knowledge and environmental attitudes and behaviors. Responsible behavior was more strongly associated with willingness to make sacrifices than with attitudes toward the environment (Kulemeier et al., 1999). This study demonstrated that if the goal for students was to take action to improve the environment, mere knowledge of environmental issues was not enough. Furthermore, Winograd (2016) asserted that environmental sustainability could only be achieved if the educational system implemented favorable environmental practices in the schools to change how children think about the environment.

Teaching only the technical aspects of the subject matter is not sufficient. If the goal of education is to teach students to raise real-world questions and problems and to take action with

others to build a more just and sustainable world (Winograd 2016), the teaching method and the curriculum have to change the way students think (Boeve-de Pauw, Gericke, Olsson, & Berglund, 2015).

The environment has to be considered when designing the curriculum because ecological concerns are not the same all over the world. Even close communities that share roughly the same geographic area may vary considerably in their environmental concerns. Examples of this are the cities of Detroit and Flint, Michigan. On the one hand, in Detroit, a mass shutoff campaign begun in 2014 left 50,000 households without water service due to late payments of their water bills (Hunter, 2016 The Detroit News). However, Detroit residents argue that they are late on their water bills not because of negligence but due to the high cost of the city's water (We the People of Detroit, 2016). On the other hand, in Flint households, high levels of lead in the water were found due to government negligence that created a serious public health risk. Consequences of this water crisis could take decades to surface (Clark, 2015). Even though both of these cities have many commonalities, the ecological concerns are not the same.

ESD takes many forms throughout the world (McKeown, 2002). However, when incorporated into an interdisciplinary curriculum, this pedagogy allows the student to learn or build on what they have learned previously in the classroom and apply it to areas of their lives. By integrating critical issues, such as climate change, biodiversity, disaster risk reduction (DRR), and sustainable consumption and production (SCP) into the curriculum, students are taught to become life-long learners and contribute towards an environmentally sustainable planet for present and future generations (UNESCO, 2014).

Empirical research suggested that ESD does work (Boeve-de Pauw et al, 2015). For example, in a study conducted with 2,413 students in grades 6, 9, and 12 from 51 schools across

The Netherlands, results supported the key role that ESD played in addressing sustainable development (SD). In addition, ESD is leading to a more sustainable future. Through a series of descriptive analyses and the estimation of structural equation models, results in this study indicated that ESD can influence student outcomes in terms of their sustainability consciousness. However, little empirical research exists that indicates how ESD can be implemented successfully. Most programs are created based on gut level feelings (Boeve-de Pauw et al, 2015), demonstrating that more research is needed to implement effective forms of ESD and determine the extent to which students' knowledge, behaviors, and attitudes regarding Eco-Justice issues change. Research that establishes what works and what does not is needed. The aim of this study is to fill that gap.

An initiative taken to include ecological sustainability in the curriculum was the Eco-Schools Program identified by the United Nations Environment Program (UNEP); the lead United Nations (UN) program concerned with the environment, as a model initiative for ESD (FEE-UNEP MoU, 2003). It is an international program of the Foundation for Environmental Education (FEE), a non-governmental, non-profit organization promoting sustainable development through ecological sustainability. Presently, this program “involves more than 11 million students across 52 countries, making the Eco-Schools Program the largest sustainable schools program in the world” (Spínola, 2015, p. 398). Private and public schools in Puerto Rico have been implementing the Guidelines of the Eco-Schools Program since 2005 (Vilches, 2015). The curriculum is designed in a participatory, student-centered manner to equip them to act for sustainability, explore, take action, and transform what they have learned to adopt a sustainable lifestyle. The Eco-Schools Program also encourages students, teachers, parents, and the community to engage and take active roles locally and globally to contribute to creating a

sustainable world. The learning outcomes of this curriculum seek to stimulate learning and promote competence such as critical and systemic thinking and decision-making skills (UNESCO, GAP, 2015).

While conducting interviews for a video on the benefits of implementing the curriculum for sustainable development in grades K-12 (Aquino, 2015), an opportunity was found in Puerto Rico to observe relationships among private middle and high school students and their knowledge, attitudes, and behaviors regarding Eco-Justice issues while participating in an Eco-Schools Program. Puerto Rico is the largest insular non-incorporated territory of the United States located in the northeastern Caribbean Sea. Like most of the archipelagos, Puerto Rico has limited natural resources that have been hyper exploited first for its mining and agricultural resources, to provide mineral wealth, tropical commodity, and lately for tourism and predatory banking practices, all of which has contributed to weakening the islanders' ecological base of survival. This in turn could explain the growing shift towards educational reform that embraces eco-justice as a viable alternative. The school directors reported that their schools were implementing the Guidelines of the Eco-Schools Program managed by the “Organizacion Pro Ambiente Sustentable (OPAS) since 2005. They explained that the program integrates environmental topics in the regular classroom and promotes good environmental practices in communities through efficient and sustainable use of resources (Berrios Cruz & Rodriguez Fernos, 2011; Vilches, 2015). Furthermore, Eco-Justice Education forms part of the effort in Puerto Rico to teach learners that, “to be human is to live engaged in a vast and complex system of life, and human well-being depends on learning how to protect it” (Martusewicz & Edmundson, 2005, p. 12).

The Eco-Schools Program has broad similarities and differences to the Dutch Environmental Policy Plan of 1989. The government's underlying idea in The Netherlands was that students who knew a lot about the environment had positive attitudes toward it and were likely to behave in an environmentally responsible manner. However, results of the Dutch National Assessment Program suggest that environmental knowledge that students already possessed was likely to be determined by topicality and to be fragmented, incorrect, or both (Kuhlemeier et al.,1999). This approach resulted in positive attitudes towards the environment but not changes in behavior.

In contrast, private middle and high schools in Puerto Rico implement the Eco-Schools Program together with the core curriculum. The learner is taught to ask questions about and reflect on their environment. Additionally, these schools encourage students to use the knowledge obtained in the classroom to solve real problems in their lives and communities. This knowledge helps students to have agency to make changes in their lives (Vilches, 2015; Berrios Cruz & Rodríguez Fernós, 2011).

The specific context, including demographics, culture, and location also make this Eco-Schools Program a valuable topic to study. In the study conducted in The Netherlands, the government was the entity that decided whether or not to implement the program (Kuhlemeier et al., 1999). In contrast, private schools in Puerto Rico made the decision to implement the program (Vilches, 2015). As private schools, they have more flexibility in terms of meeting curricular goals and program implementation; they can implement an ESD curriculum because their schools are more autonomous than the public schools. By studying this program, changes in knowledge, attitudes, and behaviors regarding Eco-Justice issues among students who are participating in an Eco-Schools Program in Puerto Rico can be described.

Problem Statement

Ecological sustainability is the capacity of ecosystems to maintain their essential functions and processes and return their biodiversity in full measure over the long term. Ecological sustainability can be achieved only if educational systems worldwide implement ecological education in the schools to promote learners' knowledge, attitudes, and behaviors regarding the importance of reconnecting humans with the natural world and creating an environmentally just planet for present and future generations (Berrios Cruz & Rodriguez Fernos, 2011; Henderson & Milstein, 2007; Martusewicz & Edmunson, 2015; Winograd, 2016).

Common Core State Standards (CCSS), an educational initiative that details what K–12 students should know in English Language Arts and Mathematics at the end of each grade, are supported by the heads of corporations, the computer industry, and government officials who promote the initiative as a necessity to make the United States more competitive in the global economy (Bowers, 2015). However, these reforms could impede awareness of the ecological crisis further by not addressing the need to implement ecological education in K-12 schools. Additionally, CCSS could undermine the possibility that students could acquire the conceptual basis necessary to recognize how ecologically problematic assumptions are inherited from the past; the denial of an ecological crisis might be reinforced through CCSS (Bowers, 2015). The danger being confronted in the United States is the denial of the impact that the ecological crisis is having on the planet and its citizens (Bowers, 2015)

A paucity of empirical research has been found that supports successful implementation of ESD in K-12 schools. An opportunity was found in Puerto Rico to examine differences between students in private middle and high schools on knowledge, attitudes, and behaviors regarding Eco-Justice issues among participants in an Eco-Schools Program. This program,

managed by the Organizacion Pro Ambiente Sustentable (OPAS; Vilches-Norat, 2015), integrates environmental topics into regular classroom instruction and promotes good environmental practices in the communities through the efficient and sustainable use of the resources (Berrios Cruz & Rodriguez Fernos, 2011; Vilches-Norat, 2015). Eco-Justice Education is a part of the effort in Puerto Rico to teach learners ecological sustainability.

Purpose of the Study

The purpose of this study is to describe the relationship between knowledge, attitudes, and behaviors regarding Eco-Justice issues among middle and high school students participating in Eco-Schools in Puerto Rico.

Research Questions. Four research questions have been developed for this study:

1. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of schools?
2. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of schools?
3. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of schools?
4. Can knowledge of Eco-justice issues be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico?

Research Hypotheses. For each research question, an associated hypothesis was developed.

- H₁: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school.
- H₂: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.
- H₃: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.
- H₀₄: Knowledge of Eco-justice issues can be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.

Null Hypotheses. The four hypotheses had the following null hypotheses.

- H₀₁: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school,
- H₀₂: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.
- H₀₃: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.
- H₀₄: Knowledge of Eco-justice issues cannot be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.

Significance and Need for the Proposed Study

From this study, many ideas could enable educators to develop programs that are relevant and culturally appropriate for schools by taking into consideration the local, environmental, economic, and societal conditions of the students, their schools, and their communities. First, the data collected on students' knowledge, attitudes, and behaviors regarding Eco-Justice issues can contribute to the improvement of basic education in that it can describe how ESD may or may not enhance the curriculum across the board, through developing the much needed interconnectedness – understanding that they are part of the environment – of K-12 students (Winograd, 2016; Dewey, 1938). Second, the data may reveal how sensibilities around place, culture, ecology, and family converge in the Eco-Schools Program and enable assessment of how local sensibilities shape ESD curriculum. Third, the findings may also reveal the importance of keeping a clear lens of the students' environmental concerns to address ecological sustainability, public understanding, and awareness through ESD. This information may also benefit curriculum development because it can inform educators of programs that empower students to be agents of change for developing a sustainable world by engaging them in fun, action-oriented, and socially responsible learning. Students can be engaged academically for any and or all opportunities available to them. Fourth, the data may contribute to the needs of implementing ESD in the schools. The findings from this study can enable educators to implement programs that are relevant and culturally appropriate by considering local, environmental, economic, and societal conditions. With this knowledge, educators can determine the portability of the Eco-Schools ESD program for other populations with diverse cultures, along with understanding which aspects might need to be adapted to transfer its pedagogical practices to other places, such as Detroit.

Definition of Terms

Eco-Justice – Teaching for “peaceful relations between human and non-human life” (Winograd, 2016, p. 129).

Eco-Justice Education – A pedagogy that teaches “how to generate the sense of local responsibility and mutual support that has been under-mined by national and international market forces” (Bowers, 2001b, p. 11).

Eco-Schools Program – an international program of the Foundation for Environmental Education (FEE) that aims to empower students to be the change our sustainable world needs by engaging them in fun, action-orientated and socially responsible learning (Eco-Schools, 2013).

Education for Sustainable Development (ESD, or sometimes EfSD) refers to “a transformation to put environmental concerns at the center of a critical, participatory education” (Martusewicz et al., 2011, p. 12).

Environmental Education (EE) – Teaching “students” basic knowledge of ecology, ecological systems, encouraging appreciation of the outdoors, and awareness of ecological issues” (Martusewicz et al., 2011, p. 10).

Sustainability – That which does “not interfere with the ability of natural systems to renew themselves” (Martusewicz et al., 2011, p. 22).

Sustainable development – “meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987, p 43).

Assumptions

One assumption made for this study is that the Eco-Schools are implementing the ESD curriculum/initiative according to guidelines established by FEE. A second assumption is that the

students were honest when completing the survey and not answer in what they perceive to be a socially desirable way.

Limitations

The following limitations are acknowledged for this study. This study was conducted in two private Eco-Schools in Puerto Rico; therefore, the findings may not be generalizable to other public or private schools in either Puerto Rico or the United States. One of the issues associated with ESD is that a specific model is lacking due to it being an initiative that must consider many factors unique to the students, schools, and communities. Second, the sample was limited to 7th through 12th grade students. While students at lower grade levels may be practicing some of the principles of Eco-Schools, the findings may not be applicable to students in these grades.

CHAPTER 2: LITERATURE REVIEW

Chapter 2 presents a comprehensive review of literature related to an Eco-Schools Program implementing the Education for Sustainable Development (ESD) curriculum with a focus on Eco-Justice Education. The topics that are included in this review are: Theoretical Framework, History of Education in Puerto Rico, and Education for Sustainability.

Theoretical Framework

The Theory of Planned Behavior (TpB) was proposed by Ajzen in 1985. Figure 1 presents a model of this theory.

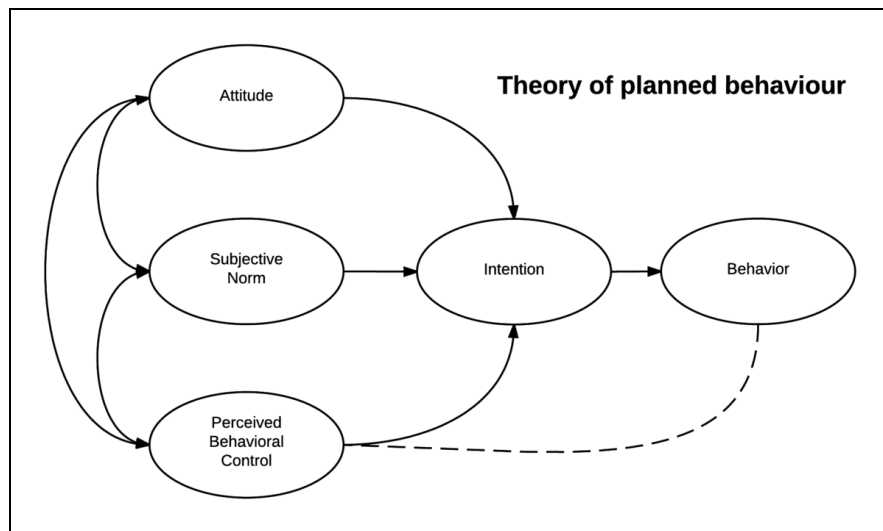


Figure 1: Diagram of Theory of Planned Behavior (TpB; Ajzen, 1985)

Ajzen, in discussing the theory of planned behavior (TpB), stated that attitudes toward behavior, subjective norms, and perceived behavioral control, together, shape an individual's behavioral intentions and behaviors. According to Ajzen (1985), human behavior is directed by three types of beliefs:

1. Behavioral beliefs about the likely consequences or other attributes of the behavior; these beliefs produce a favorable or unfavorable attitude toward the behavior.
2. Normative beliefs about the normative expectations of other people; these beliefs result in perceived social pressure or subjective norm.
3. Control beliefs about the presence of factors that may further or hinder performance of the behavior; these beliefs give rise to perceived behavioral control, the perceived ease or difficulty of performing the behavior. (p. 665).

This theory is “based on the assumption that human beings usually behave in a sensible manner; that they take account of available information and implicitly or explicitly consider the implications of their actions” (Kuhl & Beckmann, 1985, p. 12). Take for instance, parents who enroll their children in a private Eco-School that implements the Education for Sustainable Development (ESD) curriculum focused on Eco-Justice issues in middle and high school. The parents expect their children to become more aware of environmental issues. For example, if children have the opportunity to learn about environmental issues in their community, they can be expected to apply what they have learned in the classroom and find solutions to these issues in the community, working collectively with other students. Conversely, the TpB predicts that if the person does not have the awareness to perform the behavior, it is unlikely that they would perform the behavior.

The above theory was developed from the Theory of Reasoned Action (TRA) that was first proposed by Fishbein and Ajzen (1975). The model for the TRA is presented in Figure 2.

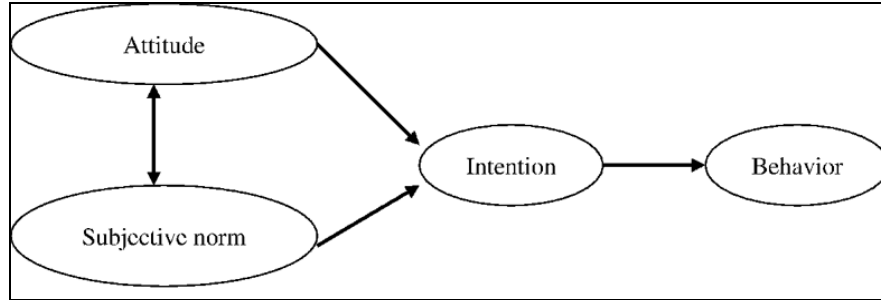


Figure 2: Theory of Reasoned Action (Madden, Ellen, & Ajzen, 1992).

TRA is used to explain the relationship between attitudes and behaviors within human action. TRA is used to predict how individuals can be expected to behave based on their pre-existing attitudes and behavioral intentions. An individual's decision to engage in a particular behavior is based on the outcomes the individual expects can result from performing the behavior. According to Kuhl and Beckmann (1985):

The TRA was shown to represent a special case of the proposed TpB. The two theories are identical when the subjective probability of success and the degree of control over internal and external factors reach their maximal values. When this is the case, we are dealing with purely volitional behavior to which the theory of reasoned action can be directly applied. When subjective probabilities of success and actual control are less than perfect, however, we enter the domain of the TpB. (p. 36)

A Glance at Education in Puerto Rico

Both Spain and the United States are valuable elements and have their place in the Puerto Rican being; one as a symbol of the cultural legacy, and the other as aspirations for economic and social progress. Although Puerto Rico began to exercise autonomous control over its formal education system in 1948, the development of this system has always been burdened with the effects of four centuries of colonialism; first under Spain, and, since 1898, under the United States.

Education in Puerto Rico before 1820 was, at best, a faint replica of education in Spain, but at a much reduced scale. Whatever affected the mother land had a direct effect on the Island.

The literature suggests that a critical study of the royal, municipal, and legislative orders during this time should be undertaken for a better understanding of education in Puerto Rico. Public education prior to the 1820s was not a function of the State; it was in the hands of the church. Children of privileged families also were taught by private teachers. In addition to religion, children were taught the three R's. They would memorize answers and regurgitate them to the teacher when asked to answer. Children of the privileged class enjoyed education of private teachers or in the few schools available while the poor were taught as charity. Adults interested in pursuing a professional education had to travel abroad (Osuna, 1949), especially to Mexico, Cuba, or the Dominican Republic, or to places in Europe.

Throughout the 17th and 18th centuries, several schools were established in various places around Puerto Rico. In 1770, under the administration of Miguel de Muesas, efforts were made to establish the first free public primary school, but this was not the general rule. The population that attended school at that time was very limited. Efforts by individual schoolteachers, namely Rafael Cordero and his sister Celestina, created private schools for the poor (Quintero, 2005-2017).

Until the end of the 18th century, the curriculum and the teaching styles in Puerto Rico were similar to those that prevailed in Spain and in the rest of Latin America in which religious education consumed a large portion of the classes. The rest of the class time was devoted to lessons on reading, writing, and some notions of mathematics. Humanities were treated superficially, and science courses were practically non-existent. Lessons were based on rote memory and critical thinking was not encouraged. In 1832 the Conciliar Seminary opened in San Juan, offering for the first time science courses alongside the traditional subjects of Latin

grammar, theology, moral philosophy, and civil and canonical law. The students of the seminary could continue their higher-level studies either in Spain or, if permitted, in Latin America.

In the 19th century, Puerto Ricans developed a strong interest in secondary education and began to petition that a university be founded, as shown in the *Instrucciones* de Ramón Power, the first Puerto Rican representative in the Spanish Cortes in 1810. By the second half of the 19th century, the need to establish a university level institution intensified; however, all efforts made in that direction were unsuccessful.

Immediately after the American occupation of Puerto Rico in 1898, radical modifications and adaptations were experienced in the educational system on the Island generating inequalities in Puerto Ricans. The purpose of public education in Puerto Rico was shifted away from a focus on the humanities and social sciences to "Americanize" the islanders and to provide them with the vocational training in agro-industrial skills needed to satisfy the expanding exploitation of sugar, coffee and other tropical commodities. Education became an instrument of consumption for the new system of culture and value imposed by the United States.

Education for Sustainability

The literature suggests that "sustainability, as a concept for actions that will result in a viable future for succeeding generations is a priority" (Taylor, Quinn, & Eames, 2013, p. ix). Most children of this generation will become adults and citizens of future generations; therefore, there is a need to prepare them to develop critical thinking, decision-making, and problem-solving skills that allow them to make informed and responsible decisions to maintain healthy and productive human beings and a sustainable planet. Education for Sustainable Development (EDS) may be an approach for the reorientation of the educational system in the United States and globally. This is not only because of the need to survive as humans but, because citizens

deserve to live in a democratic and peaceful planet. Humanistic and Ecologically Sustainable Pedagogy are two major strands within a broad educational movement that, at times, defines opposite ends of a spectrum where these different educational approaches can be plotted. They are a platform to promote Eco-Justice globally because they address both social and environmental issues. This review examined these two pedagogical strands and five pedagogical visions in this context, describing major points of confluence and divergence.

Humanistic Pedagogy (HP) or student-centered and personalized education emerged in the 1960s and one of the founders was Carl Rogers, an American psychologist. This approach to education focuses on human freedom, dignity, and the individual potential of the child, which promotes the need to study the child as a whole person (Huitt, 2009). Therefore, self-motivation and goal setting are important areas when studying the child. A central assumption of HP is that children act with intentionality and values. The teachers' role is that of a facilitator, however, "in order to develop self-actualized, autonomous citizens in a cooperative and supportive environment, the emotional and cognitive needs of the child are important" (Maslow, 1943, pp. 374-375). As described by Huitt (2009), there are five basic objectives of the Humanistic approach to education:

1. Promote positive self-direction and independence (development of the regulatory system).
2. Develop the ability to take responsibility for what is learned (regulatory and affective systems).
3. Develop creativity (divergent thinking aspect of cognition).
4. Curiosity (exploratory behavior, a function of imbalance or dissonance in any of the systems).

5. Foster an interest in the arts (primarily to develop the affective/emotional system).

What follows is a discussion of two pedagogical visions, Systemic Pedagogy (SP) and Whole Child Education (WCE) that follow the principals of HP.

Systemic pedagogy (SP) began to take form in 1999 when Olvera Garcia, an educator, pedagogue, therapist, and trainer together with a team in Mexico experimented with different forms of educational methods (Parellada Enrich, 2006). This approach visualizes the educational system as an ecosystem that permits everything to be linked by the systems of the family, culture, history, and society. Furthermore, it seeks to understand how all these systems influence the process of teaching and learning. This educational paradigm sees the school as a system or organization where all the members, parents, students, administrators, teachers, and staff find themselves linked to each other (Traveser, 2007). There are hierarchies and dynamics that are established between them. Students are not seen as isolated individuals but form part of an interrelated family structure to which they are loyal within any circumstance. Discovering these loyalties constitutes a direct form of recognizing the origin and solution of the conflicts manifested in the school. SP contributes fast and efficient solutions to challenges in the classroom, for instance: learning difficulties, behavior problems, new family structures, among many others. This approach is a new lens through which education can be seen to create the ideal conditions for the classroom creating a space that works towards learning and the wellbeing of the student. This is all achieved through a deep respect and love for life. Additionally, SP seeks to change the way all those involved in educating the child are thought of. The main focus of this pedagogy is to work towards a school oriented to learn about life and the interconnectedness that exists between everything. This pedagogical vision promotes three “Orders of Love”:

Belonging – the student belongs to a system where everyone belongs; exclusion is not tolerated.

Hierarchy – Guarantees the order of the system; every member of the system has a function.

Equilibrium – To give, you have to receive; has two types of relations – asymmetrical and egalitarian (Traveser, 2007, p. 27).

The Whole Child Education (WCE) model was launched in the spring of 2014 by the Association of Supervision and Curriculum Developers (ASCD, 2014). It aims to better align the policies, processes, and practices of education, public and school health to improve learning and health. This pedagogical vision promotes that students be prepared for college, career, and citizenship to better develop and prepare them for challenges and opportunities of the present and future by involving everything in their environment. WCE sets the standard for comprehensive, sustainable school improvement and works towards long-term student achievement. The five tenets of this pedagogical vision are:

1. Each student enters school healthy; learns about and practices a healthy lifestyle.
2. Each student learns in an environment that is physically and emotionally safe for students and adults.
3. Each student is actively engaged in learning and is connected to the school and broader community.
4. Each student has access to personalized learning and is supported by qualified, caring adults.
5. Each student is challenged academically and prepared for success in college or further study and for employment and participation in a global environment (ASCD, 2014).

In the end, SP and WCE do not only have confluences and departures with HP but also within each other. With regards to HP, these two visions promote human freedom, dignity, and potential by reinforcing positive self-direction, independence, and the ability to take responsibility for what is learned. Similarly, the confluences seen between SP and WCE are learning in a personalized and safe environment. Notwithstanding, there are departures between the two. For instance, SP emphasizes the importance of seeing the child within her or his system: parents, teachers, school, community, history, and the society to whom the child is loyal under any circumstance. “By knowing the child in this way, the teacher can attend to the child’s emotional and cognitive needs” (Maslow, 1943, pp. 374-375) in the learning environment. In addition, by having that knowledge, the teacher can contribute fast and efficient ways to solve the challenges and needs of the learner in areas such as learning difficulties, behavior problems, and new family structures. Another clear departure between these two pedagogical visions is that, even though WCE also promotes a safe learning environment, its major emphasis is on preparing the student for furthering their studies, college, employment, and to participate in the global environment whereas Systemic Pedagogy promotes seeing the child not in isolation within their environment but as part of an eco-system.

Ecological sustainability (ES) refers to the capacity of the biosphere to meet the needs of the present generation, without hindering future generations from being able to meet their needs (WCED, 1987). One of the most encouraging developments that used a goal-oriented program for political change concerning ecological sustainability was The World Conservative Strategy published in 1980 (Allen, 1980). ES has been defined as “improving the quality of human life while living within the carrying capacity of supporting ecosystems” (Smith, 1995, p. 268). ES relies on the fact that human beings have the ability to overuse the natural resources available by

leaving nothing but air, water, and soil pollution for future generations. It promotes that everyone must use the resources available wisely and efficiently in order for them not to become exhausted or over-polluted. There are three chief conservation objectives for ES:

1. Maintaining essential biogeochemical cycles and life-support systems.
2. Preserving genetic diversity.
3. Establishing a sustainable use of species and ecosystems.

EfS, EE, and ESD are three important strands in Ecologically Sustainable Pedagogy. These three terms are used synonymously and interchangeably throughout the literature. Notwithstanding, there are distinctive differences between “education about and education for sustainable development” (McKeown, 2002, p. 7). While they share much in common, they differ in important ways.

Education for Sustainability (EfS)

(EfS) is the continual refinement of the knowledge and skills that lead to an informed citizenry that is committed to responsible individual and collaborative actions that result in an ecologically sound, economically prosperous, and equitable society for present and future generations. The main objectives of EfS are to ensure that awareness, knowledge, and the understanding of sustainability become part of the mainstream consciousness, both nationally and internationally; engage key domestic constituencies in a dialogue about sustainability to produce consensus; and, foster the skills, attitudes, motivation, and values that redirect action to sustainable practices and produce the commitment to work individually and collectively toward a sustainable world (Brundtland, 1987).

The principles underlying EfS include, but are not limited to:

1. Strong core academics

2. Understanding the relationships among disciplines
3. Systems thinking – everything connected to everything else
4. Lifelong learning
5. Hands-on experiential learning
6. Community-based learning
7. Technology, partnerships
8. Family involvement
9. Personal responsibility

Environmental Education (EE)

EE is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions. UNESCO emphasizes the role of EE as “safeguarding future global developments of societal quality of life (QOL) through the protection of the environment, eradication of poverty, minimization of inequalities and insurance of sustainable development” (2014a, p. 16).

The components of environmental education are:

1. Awareness and sensitivity to the environment and environmental challenges.
2. Knowledge and understanding of the environment and environmental challenges.
3. Attitudes of concern for the environment and motivation to improve or maintain environmental quality.
4. Skills to identify and help resolve environmental challenges.
5. Participation in activities that lead to the resolution of environmental challenges.

EE does not advocate a particular viewpoint or course of action. Rather, EE teaches individuals how to weigh various sides of an issue through critical thinking and it enhances their own decision-making and problem-solving skills. In addition to teaching about the environment, EE also:

1. Increases public awareness and knowledge of environmental issues.
2. Helps individuals develop critical thinking, decision-making, and problem-solving skills.
3. Does not advocate a particular viewpoint.

Education for Sustainable Development (ESD)

Sustainable development is development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p. 43). Sustainable development is generally thought to have three components: environment, society, and economy. The wellbeing of these three areas is intertwined, not separate. Thus, the authors consider sustainability to be a paradigm for thinking about a future in which environmental, societal, and economic considerations are balanced in the pursuit of development and improved quality of life (McKeown, 2002). ESD enables citizens to constructively and creatively address present and future global challenges and create more sustainable and resilient societies (UNDESD, 2005-2014, p. 17).

Key characteristics of this pedagogical vision are:

1. Interdisciplinary and holistic: embedded in the whole curriculum.
2. Values-driven: assumed values and principles of SD are made explicit so they can be examined, debated, tested, and applied.

3. Critical thinking and problem solving: leading to confidence in addressing the dilemmas and challenges of sustainable development.
4. Multi-method: teachers and learners work together to acquire knowledge and play a role in shaping the environment of their educational institution.
5. Participatory decision-making: learners participate in decisions on how they are to learn.
6. Applicability: the learning experiences offered are integrated in day to day personal and professional life.
7. Locally relevant: addressing local as well as global issues, and using the language(s) which learners most commonly use.

The above descriptions of EfS, EE, and ESD provide a form to identify the confluences and departures that exist among the three. The following was found throughout the literature:

1. Critical thinking, decision-making and problem-solving skills that are learned contribute to the learner developing confidence in addressing the dilemmas and challenges of sustainability and environmental issues.
2. Learners participate in decisions on how they are to learn.
3. Values and principles of sustainability are made explicit so that they can be examined, debated, tested, and applied.
4. Awareness and sensitivity to the environment and environmental challenges is promoted.
5. Hand-on, experiential, and lifelong learning is promoted.
6. Strong core academics are available.

Four departures were found in these pedagogical visions.

1. EfS advocates the continual refinement of the knowledge and skills that lead to an informed citizenry that is committed to responsible individual and collaborative actions that result in an ecologically sound, economically prosperous, and equitable society for present and future generations (WCED, 1987). It is also focused on the development of the individual while EE emphasizes educating towards the understanding of environmental issues without putting emphasis on a particular viewpoint in working with children and the public in general.
2. EE is a multi-disciplinary field that integrates mathematics and science in their teaching. However, oftentimes, it includes efforts to educate the public and other audiences by including print materials, websites, and media campaigns in their promotions. EE informs the learner on environmental issues then allows the individual to work with the knowledge acquired to make their own decisions.
3. EfS is focused on using the knowledge learned on sustainability for further development as an adult and ESD is focused on teaching in the classroom.
4. ESD advocates the importance to “meet the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p 43), 3). Even though ESD addresses global issues, its main focus is on issues affecting the community which becomes the students’ laboratory for revealing and solving problems so as to learn in the community and from the community.

In summary, Humanistic and Ecologically Sustainable Pedagogies are very similar in that they both promote a sense of responsibility on the part of the student by emphasizing teaching towards a better world. They both promote and emphasize social and environmental issues,

which make these pedagogies appropriate for the change needed in the educational system. As demonstrated in this discussion, Systemic Pedagogy, Whole Child Education, Education for Sustainable Development, Education for Sustainability, and Environmental Education can be placed from one end of the spectrum to the other, however, they can also be seen as interlaced, because the concerns of one can be reflected in another. Additionally, these five pedagogical visions promote the development of critical thinking, decision-making, and problem-solving skills necessary for the development of self-actualized and autonomous citizens who work towards a better world (McKeown & Hopkins, 2002).

In defining a particular pedagogical vision as a hybridity of the various approaches discussed, my vision would run from one end of the spectrum between Humanistic and Ecologically Sustainable Pedagogy to the other interlacing one with the other pedagogical visions. Being that Peace Education is not included in the five visions discussed, it would also form part of my pedagogical vision because, since war was created by humans, I believe that it is the human mind that finds the road to peace. Even though this vision involves teaching similar skills incorporated in the other pedagogical visions, my interest in including it in the curriculum would be to teach conflict resolution for the student to learn that, when there is a conflict or dispute, they can negotiate to resolve it in a peaceful way. Additionally, the school would be a member of the Eco-Schools Program to implement the ESD initiative, which would be the platform for Eco-Justice and for all other aspects of the curriculum. Taking from the systemic pedagogic vision, everyone and everything involving and affecting the students' learning were carefully addressed. For instance, the parents, family, and the community are an integral part of the learning environment. Some of the key principles taken from this pedagogy would be to educate the students to love life and the planet; this would be taught through learning the

democratic process, the freedom to think to become a conscious citizen geared towards peace, and the preservation and conservation of the environment. Freedom of learning is promoted through different forms. For instance, the students would be allowed to be spontaneous, creative, and independent. Implementing ESD teaches students what it is to be in harmony with the environment and in peace with oneself knowing that they are working towards a better world. Also, students learn what it means to respect all forms of life. Moreover, a garden is available at the school not only for planting and growing, but also for contemplation—a form of meditation. My pedagogical vision includes music, movement, hiking, play, freedom to lead, and collaboration for the development of problem-solving skills that are used throughout the students' life. Furthermore, learners are allowed to study independently as well as joining a group or subject they are interested to work with during the school day. What is more, the parents, teachers, administrators, and community members form an integral part of the school environment by providing teacher, parent, and administrator training workshops on sustainability and systemic pedagogy available free-of-charge. Another aspect of the school environment is that all involved in the school are able to share and exchange the products produced in the school garden and businesses throughout the community are able to purchase them at a minimal price. And, as a final point, to help students have hands-on experience with technology and engage them in learning how best to use it productively, a website has been designed and is available for the use of any student from the school and worldwide where they have a space to share their work, experiences, and comments in relation to education for sustainable development. This pedagogical vision is a platform to promote Eco-Justice globally.

CHAPTER 3: METHODOLOGY

This chapter discusses the methods used to collect and analyze the data needed to address the research questions and test the hypotheses for this study. The topics in this chapter include: purpose of the study; research design; setting for the study; participants; instrumentation; data collection procedure; and data analysis.

Purpose of the Study

The purpose of this study is to describe the relationship between knowledge, attitudes, and behaviors regarding Eco-Justice issues among middle and high school students participating in the Eco-Schools Program in Puerto Rico. The study addresses four questions:

1. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of schools?
2. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of schools?
3. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of schools?
4. Can knowledge of Eco-justice issues be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico?

Research Hypotheses.

- H₁: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school.
- H₂: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.
- H₃: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.
- H₀₄: Knowledge of Eco-justice issues can be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.

Null Hypotheses.

The specific null hypotheses to be examined are:

- H₀₁: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school,
- H₀₂: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.
- H₀₃: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.

H₀₄. Knowledge of Eco-justice issues cannot be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.

Research Design

A nonexperimental causal comparative research design was used to compare differences in knowledge, attitudes, and behaviors of middle and high school students regarding eco-justice issues that are associated with ESD implemented in private Eco-Schools in Puerto Rico. This type of design is used when the independent variable is not manipulated and no intervention or treatment is provided to the students included in the study. Causal comparative research designs attempt to determine cause and effect relationships among variables. Typically, a dependent variable is compared between two or more groups. This type of research design lacks the rigor of a true experiment, but is useful when a true experiment cannot be conducted (Creswell, 2014). An adapted version of the Children's Environmental Attitude and Knowledge Scale (CHEAKS, Leeming, Dwyer, & Bracken, 1995) was used as the primary data collection tool for this study (See Appendix A).

The focus of the research was the knowledge, attitudes, and behaviors of 7th through 12th grade students participating in private Eco-Schools in Puerto Rico. The dependent variable was knowledge regarding eco-justice issues and attitudes and behaviors regarding eco-justice issues as measured by the adapted version of the CHEAKS mentioned previously. The independent variable was the school level; high school or middle school. The instrument used for the study assessed knowledge, attitudes and behaviors of students who were participating in Eco-Schools Programs at their respective schools.

Setting for the Study

The setting for this study was two private Eco-Schools in the municipality of Caguas located in the Central Mountain Range of Puerto Rico, south of San Juan. Private schools were selected because they had more funds and resources available for implementing programs such as this one. The focus on middle and high school grade ranges was to assess the cumulative impact of Eco-Justice Education (EJE) over the course of these students' education.

Participants in the Study

Female and male students from grades 7th and 8th in School A and 7th through 12th in School B were asked to participate in this study. A power analysis was used to determine the number of students needed to test the hypotheses and address the research questions. Using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009), with an alpha level of .05, an effect size of .50, and a power of .80, a sample of 102 (51 in each group) was needed to test the hypotheses. Sample sizes greater than 102 could improve the power of the analysis. Figure 1 presents a graph of the sample sizes needed at various levels of power.

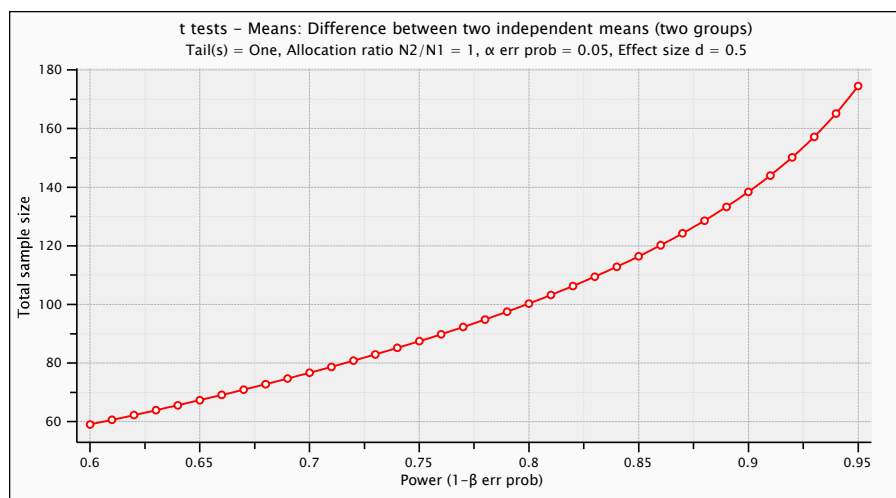


Figure 3: Power analysis from G*Power 3.1 (Faul et al., 2009)

Instrumentation

An adapted version of the Children's Environmental Attitude and Knowledge Scale (CHEAKS; Leeming, Dwyer, & Bracken, 1995) was used to obtain data on students' knowledge, attitudes and behaviors regarding Eco-Justice issues. The CHEAKS was originally adapted from a survey by Maloney, Ward, and Braucht (as cited in Leeming et al., 1995). The items were either modified or eliminated, because they were not suitable for children. The CHEAKS was revised based on responses from pilot tests. These pilot tests included having children complete the survey informally; administering the survey to children in a Sunday school class, giving the survey to children in classrooms in a public school, and having 600 students in 22 classes in the Memphis area complete the survey. After each pilot test, the survey was revised to reflect comments from the children. These revisions included reducing grade level readability, using simpler terms, clarifying item stem. At the completion of the pilot tests and subsequent revisions, the final version of the CHEAKS was considered ready for psychometric testing (Leeming et al., 1995).

The final version of CHEAKS was divided into two subscales: attitudes and knowledge. The attitude subscale has 36 items that measure verbal commitment, actual commitment, and affect. Each section is comprised of 12 items that reflect six domains: animals, energy, pollution, recycling, water, and general. The subscale measuring knowledge includes 30 items that measure students' understanding of the same six domains. A total score is available for the attitudes and knowledge scale.

The CHEAKS was further adapted with permission of Leeming et al. The adaptations included reducing the number of items on the scale from 36 items measuring attitudes and behaviors to 12 items measuring attitudes and 12 items measuring behaviors. Twelve items were

used to measure eco-justice knowledge. All items on the adapted version of the CHEAKS were rated using a 5-point scale ranging from 1 for strongly disagree to 5 for strongly agree.

Scoring. The numeric ratings on each of the subscales, knowledge, attitudes, and behaviors, were summed to obtain a total score. The total scores were each divided by 12 to obtain a mean score. The use of mean scores reflected the original 5-point scale, with higher scores indicating greater agreement with the items. Mean scores also allow comparison across the subscales.

Validity and Reliability. Leeming et al. (1995) conducted preliminary tests on the CHEAKS using 50 intact classes of students in 12 different elementary and middle schools. The students completed the CHEAKS twice, at the beginning and end of the academic year. The authors tested two types of reliability, stability and internal consistency. Pearson product moment correlations were used to correlate the first administration with the second administration. Statistically significant correlations were obtained for total scores, attitude, and knowledge ($r = .69, .68, .65$ respectively). These findings were considered high given the length of time between test administrations. Lower, but statistically significant, correlations were also found when attitude and knowledge were correlated. Cronbach alpha coefficients were obtained for the first administration of the CHEAKS to establish internal consistency. The obtained alpha coefficients of .88, .89, and .73 for total scale, attitude questions, and knowledge questions were considered evidence that the CHEAKS had good internal consistency (Leeming et al. 1995).

The CHEAKS was tested for convergent and divergent validity, which were considered positive for both subscales; attitude and knowledge (Leeming et al., 1995). The correlations between verbal commitment with knowledge ($r = .17$) and actual commitment with knowledge ($r = .12$) were low indicating the scale items were measuring independent concepts.

The scale was tested for developmental age progression by Leeming et al. (1995). The results of the analysis of variance (ANOVA) procedures indicated that younger children scored lower on the knowledge test both on the first and second administration. On the attitude scale, younger children had significantly higher scores than the older children, although the mean scores for both groups were above the neutral point of not sure indicating generally positive attitudes about the environment. Because of differential dropouts on the second administration, repeated measures ANOVA indicated that both knowledge and attitudes improved for children who completed both administrations (Leeming et al., 1995). Based on these findings, the CHEAKS appears to have good reliability and validity. The adapted version of the CHEAKS used in the present study was tested for internal consistency, with results reported in Chapter 4.

Readability. The readability of the CHEAKS was tested using the Flesch-Kincaid readability index. The obtained outcome of 6.2 indicated that children reading at or above sixth grade levels would have no difficulty in reading the survey items.

Data Collection Procedures

Following approval from the Wayne State University Institutional Review Board (IRB) data collection procedures began. The researcher obtained letters of cooperation for each of the research sites included in the study. The researcher created packets that included a copy of the informed consent form (see Appendix B) and a preaddressed, postage paid envelop for the school to mail to the parents of students included in the study. The informed consent provided information about the study, the extent to which the students were involved in the study, assurances of confidentiality, voluntary nature of participating, and risks and benefits associated with participation. The parents were asked to indicate their permission for their child to participate in the study and return the form to the researcher using the enclosed preaddressed,

postage paid envelope. Those students whose parents did not return the consent form were not allowed to participate in the study.

Following the return of the informed consent forms, a meeting was held with the teachers of the students in the study to explain the purpose, distribution, and collection procedures for the questionnaire. The researcher explained to the students that they would also need to sign an assent form prior to distribution of the surveys. The assent form is required for all students between 13 and 17 years of age. This form can be found in Appendix C.

Only those students who has received permission from their parents to take part in the study and had signed the assent form received a questionnaire. The students were cautioned not to place any identifying information (e.g., name, student id) on the questionnaire. The teachers asked students to work quietly and not share any information about the questionnaire with other students. As students completed the questionnaire, they were asked to place them in a manila envelope located on the teachers' desk. Students whose parents gave permission to participate in the study but were absent during data collection were not allowed to participate in the study.

The informed consent forms and student assent forms are stored separately in a locked file cabinet in the researcher's home. The questionnaire is maintained separately in a locked file cabinet in the researcher's home. The data is stored on a password protected flash-drive maintained by the researcher. These precautions are used to protect the confidentiality of the participants in the study.

Data Analysis

The data from the questionnaires was entered into a computer file for analysis using IBM-SPSS ver. 25.0. The data was screened for normality using the Explore command on SPSS. After cleaning the data, a missing values analysis was used to determine the extent to which

students did not complete all items on the questionnaire. Based on this analysis, questionnaires with excessive missing data were eliminated from the study. Principal components factor analysis was used to test the construct validity of the three sections of the survey that are rated using a Likert-type scale. To be maintained on the section, the item had a loading greater than .35 and not load on more than one factor. Items that did not meet these criteria were eliminated from the analysis. The analysis also determined if subscales could be formed on the three sections of the questionnaire. The subscales were then used in the inferential analysis used to test the hypotheses.

Cronbach alpha coefficients were obtained for the three sections measuring knowledge, attitudes, and behaviors. The alpha coefficients for the three sections are reported in Chapter 4.

The data analyses were divided into three sections. The first section used frequency distributions, measures of central tendency and dispersion, and cross-tabulations to provide a profile of the demographic characteristics of students in the two schools. The second section used descriptive statistics to provide baseline information regarding the three sections of the survey. In addition, an inter-correlation matrix was obtained to determine the direction and magnitude of the relationships among the variables. The third section of the questionnaire used t-tests for independent samples to determine differences between students in the two schools on the knowledge, attitudes and behaviors of eco-justice issues at their schools. Pearson product moment correlations were used to determine the strength and direction of the relationship between knowledge, attitudes, and behaviors regarding eco-justice issues. All decisions on the statistical significance of the findings were made using a criterion alpha level of .05. Table 1 presents the statistical analysis used to test each of the hypotheses and address the research questions.

Table 1

Statistical Analysis

Research Questions and Hypotheses	Variables	Statistical Analysis
<p>1. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of schools?</p> <p>H₁: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school.</p> <p>H₀₁: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school,</p>	<p><u>Dependent Variable</u> Students' knowledge towards eco-justice issues</p> <p><u>Independent Variable</u> Grade level of students</p> <ul style="list-style-type: none"> • Middle school • High School 	<p>A t-test for two independent samples was used to compare student knowledge towards eco-justice issues between middle and high school students</p>
<p>2. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of schools?</p> <p>H₂: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.</p> <p>H₀₂: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher</p>	<p><u>Dependent Variable</u> Students' attitudes towards eco-justice issues</p> <p><u>Independent Variable</u> Grade level of students</p> <ul style="list-style-type: none"> • Middle school • High School 	<p>A t-test for two independent samples was used to compare student attitudes towards eco-justice issues between middle and high school students</p>

Research Questions and Hypotheses	Variables	Statistical Analysis
<p>scores for attitudes regarding eco-justice issues than middle school students in the same type of school.</p> <p>3. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behavior regarding eco-justice issues than middle school students in the same type of schools?</p> <p>H₃. High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.</p> <p>H₀₃. High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.</p>	<p><u>Dependent Variable</u> Students' behaviors regarding eco-justice issues</p> <p><u>Independent Variable</u> Grade level of students</p> <ul style="list-style-type: none"> • Middle school • High School 	<p>A t-test for two independent samples was used to compare student behaviors regarding eco-justice issues between middle and high school students</p>
<p>4. Can knowledge of Eco-justice issues be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico?</p> <p>H₄. Knowledge of Eco-justice issues can be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.</p> <p>H₀₄. Knowledge of Eco-justice issues cannot be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.</p>	<p><u>Criterion Variables</u> Attitudes Behaviors</p> <p><u>Predictor Variables</u> Knowledge of Eco-justice issues</p>	<p>Pearson product moment correlations were used to determine the strength and direction of the relationships between knowledge and attitudes and behaviors of Eco-justice issues.</p>

CHAPTER 4: RESULTS

The results of the statistical analyses that were used to describe the sample, address the research questions, and test the associated hypotheses are presented in this chapter. The chapter is divided into two sections. The first section provides a description of the sample, with the second section presenting results of the inferential statistical analyses.

The purpose of this study is to describe the relationship between knowledge, attitudes, and behaviors regarding eco-justice issues among middle and high school students participating in Eco-Schools in Puerto Rico.

Ninety-three students attending eco-schools in Puerto Rico participated in the study by completing a survey to measure their knowledge, attitudes and behaviors regarding eco-justice issues. The survey was divided into four sections, demographic, knowledge of eco-justice, attitudes, and behaviors toward eco-justice. The responses to items on the knowledge, attitudes, and behaviors were tested for internal consistency using Cronbach alpha coefficients. The results of these tests are presented in Table 2.

Table 2

Cronbach Alpha Coefficients: Knowledge, Attitudes, and Behaviors Associated with Eco-Justice

Scale	N	α
Knowledge	84	.70
Attitudes	82	.72
Behaviors	86	.68

The obtained α coefficients were considered adequate for the study. While a total of 93 students participated in the study, they did not answer all the items on each of the surveys resulting in missing values on each of the scales.

Description of the Sample

The students provided their ages on the survey. The responses to this question were summarized using descriptive statistics by school level, middle or high school. Table 3 presents results of this analysis.

Table 3

Descriptive Statistics: Age of Student by School Level

School Level	N	Mean	SD	Median	Range	
					Minimum	Maximum
Middle School	61	13.61	.97	13	12	19
High School	32	16.03	.65	16	15	17

The mean age of the middle school students was 13.61 (SD = .97) years, with a median of 13 years. The range of ages for the middle school students was from 12 to 19 years. High school

students had a mean age of 16.03 (SD = .65) years, with a median of 16 years. The high school students ranged in age from 15 to 17.

The students were asked to report their gender on the survey. Their responses were crosstabulated by school level. Table 4 presents results of this analysis.

Table 4

Crosstabulation: Gender of Student by School Level

Gender	<u>School Level</u>				Total	
	Middle School		High School			
	n	%	n	%	N	%
Male	9	15.0	15	46.9	24	26.1
Female	51	85.0	17	53.1	68	73.9
Total	60	100.0	32	100.0	92	100.0

Missing Middle School 1

The majority of students participating in the study at the middle school level were females (N = 51, 85.0%). The students were more evenly represented at the high school level, with 17 (53.1%) indicating their gender as female and 15 (46.9%) reporting their gender as male. One student at the middle school level did not provide a response to this question.

The students were asked to indicate their grade level at the school. Their responses were crosstabulated by school level. The results of this analysis are presented in Table 5.

Table 5

Crosstabulation: Grade in School by School Level

	<u>School Level</u>					
	Middle School		High School		Total	
Gender	n	%	n	%	N	%
Seventh	9	14.8	0	0.0	9	9.7
Eighth	44	72.1	0	0.0	44	47.2
Ninth	8	13.1	0	0.0	8	8.6
Tenth	0	0.0	18	56.2	18	19.4
Eleventh	0	0.0	14	43.8	14	15.1
Total	61	100.0	32	100.0	93	100.0

The majority of the students at the middle school were in the 8th grade (N = 44, 72.1%), with 9 (14.8%) students in the 7th grade and 8 (13.1%) students at the ninth grade. In the high school, 18 (56.3%) students were in the 10th grade and 14 (43.8%) students were in the 11th grade.

The students were asked to indicate the number of years they had attended their schools. Their responses were summarized using descriptive statistics. Table 6 presents results of this analysis.

Table 6

Descriptive Statistics: Years at School by School Level

School Level	N	Mean	SD	Median	Range	
					Minimum	Maximum
Middle School	60	2.07	1.29	2.00	1	11
High School	32	4.34	1.80	4.00	1	12

Missing Middle School 2

The students at the middle school had been at their present school for a mean of 2.07 (SD = 1.29) years, with a median of 2. The range of years at the school as reported by students was from 1 to 11 years. The high school students had a mean of 4.34 (SD = 1.80) years at their present school, with a median of 4.00 years. The students self-reported they had been at their schools from 1 to 12 years.

Research Questions and Hypotheses

Four research questions and associated hypotheses were developed for the study. Each of these hypotheses was tested using inferential statistical analysis, with all decisions on the statistically significant significance of the findings made using a criterion alpha level of .05.

1. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of schools?
- H₁: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school.

H₀₁: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of school,

The students' scores for knowledge of eco-justice issues were compared between middle and high school students using t-tests for independent samples. The results of this analysis are presented Table 7.

Table 7

t-Tests for Independent Samples: Student Knowledge of Eco-Justice Issues by School Level

School Level	N	Mean	SD	DF	t	p
Middle School	61	4.10	.48	91	-.35	.724
High School	32	4.13	.53			

The comparison of the mean scores for knowledge of eco-justice issues did not differ significantly between middle school and high school students ($t [91] = -.35, p = .724$). Based on this result, the null hypothesis of no difference between the middle school and high school students on knowledge of eco-justice issues was not rejected.

2. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of schools?

H₂: High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.

H₀₂: High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of school.

The mean scores for student attitudes toward eco-justice issues were compared by school level using t-tests for independent samples. The results of this analysis are presented in Table 8.

Table 8

t-Tests for Independent Samples: Student Behaviors toward Eco-Justice Issues by School Level

School Level	N	Mean	SD	DF	t	p
Middle School	61	3.81	.53	91	-.60	.547
High School	32	3.88	.55			

The results of the t-test for independent samples comparing students' attitudes toward eco-justice issues was not statistically significant, $t(91) = -.60$, $p = .547$. This finding provides evidence that student attitudes toward eco-justice issues did not differ based on their school level, middle school or high school. As a result, the null hypothesis of no difference is retained.

3. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of schools?

H₃. High school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of school.

H₀₃. High school students in private schools using the Eco-Schools Program in Puerto Rico do not have higher scores for behaviors toward eco-justice issues than middle school students in the same type of school.

The mean scores for students' behaviors toward eco-justice issues were used as the dependent variable in a t-test for two independent samples, with school level used as the independent variable. Table 9 presents results of this analysis.

Table 9

t-Tests for Independent Samples: Student Attitudes toward Eco-Justice Issues by School Level

School Level	N	Mean	SD	DF	t	p
Middle School	61	3.41	.70	91	-.39	.697
High School	32	3.46	.53			

The comparison between middle and high school students on their behaviors regarding eco-justice issues was not statistically significant, $t(91) = -.39$, $p = .697$. This finding provided support to retain the null hypothesis of no difference in student attitudes toward eco-justice issues between middle and high school students.

4. Can knowledge of Eco-justice issues be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico?

H₀₄. Knowledge of Eco-justice issues can be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.

H₀₄. Knowledge of Eco-justice issues cannot be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico.

The mean scores for student knowledge of eco-justice issues were correlated with their attitudes and behaviors toward eco-justice issues. Pearson product moment correlations were used to test this hypothesis. The results of these analyses are presented in Table 10.

Table 10

Pearson Product Moment Correlations: Student Knowledge, Attitudes, and Behaviors of Eco-Justice Issues

Scale	n	r	p
	Student Knowledge of Eco-Justice Issues		
Attitudes toward Eco-Justice Issues	93	.71	<.001
Behaviors toward Eco-Justice Issues	93	.63	<.001

A statistically significant relationship was found between student knowledge of eco-justice issues and their attitudes toward these types of issues ($r = .71$, $p < .001$). The relationship between student knowledge of eco-justice issues and behaviors toward eco-justice issues was statistically significant ($r = .63$, $p < .001$). The positive direction of these relationships indicated that students with higher knowledge levels toward eco-justice issues were likely to have more positive attitudes and better behaviors toward eco-justice issues. Based on these findings, the null hypothesis was rejected.

Summary

This chapter has presented a description of the students who participated in the study and provided results of the inferential statistical analyses used to address the research questions and test the associated hypotheses. For H1-H3 no statistically significant results were obtained. For H4, there was a statistically significant correlation of moderate size. The conclusions and implications based on these results are presented in Chapter 5.

CHAPTER 5: DISCUSSION

The purpose of this study was to determine if statistically significant differences existed between middle and high school students participating in the Eco-Schools Program in Puerto Rico. Using the experience acquired during visits and the interaction with the students in the Eco-Schools, the expectation existed that those students in the higher grades would have more knowledge and positive attitudes and behaviors regarding eco-justice issues than those in the lower levels. Additionally, it was expected that students in the Eco-Schools Program would use their learning and experience in school to further their knowledge through their communities.

A nonexperimental causal-comparative research design was used to compare differences in knowledge, attitudes, and behaviors of middle and high school students toward eco-justice issues that are associated with Education for Sustainable Development (ESD) implemented in private Eco-Schools in Puerto Rico. An adapted version of the Children's Environmental Attitude and Knowledge Scale (CHEAKS; Leeming, Dwyer, & Bracken, 1995) was used to collect data on knowledge, attitudes, and behaviors toward eco-justice issues from the two groups of students in middle and high school in the Eco-Schools. In addition, a short demographic survey was included to obtain information on the participants in the study. The questionnaire was completed by 93 students in two schools. This chapter presents the discussion of the findings, along with possible limitations of the study and suggestions for future research.

Findings Related to Hypothesis 1

To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for knowledge regarding eco-justice issues than middle school students in the same type of schools?

The mean scores for knowledge regarding eco-justice issues did not differ significantly between middle school and high school students.

Related to Hypothesis 2

2. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for attitudes regarding eco-justice issues than middle school students in the same type of schools?

This study provides evidence that student attitudes toward eco-justice issues did not differ based on their school level, middle school or high school

Related to Hypothesis 3

3. To what extent do high school students in private schools using the Eco-Schools Program in Puerto Rico have higher scores for behaviors regarding eco-justice issues than middle school students in the same type of schools?

The comparison between middle and high school students on their behaviors regarding eco-justice issues revealed no statistically significant difference in student attitudes regarding eco-justice issues between middle school and high school students.

Related to Hypothesis 4

4. Can knowledge of Eco-justice issues be used to predict attitudes and behaviors of middle and high school students in eco-schools in Puerto Rico?

The mean scores for student knowledge of eco-justice issues were correlated with their attitudes and behaviors regarding eco-justice issues. The relationships between student knowledge of eco-justice issues and attitudes and behaviors regarding eco-justice issues were statistically significant, and the positive direction of these relationships indicated that students with higher knowledge levels about eco-justice issues were likely to have more positive attitudes and better behaviors regarding eco-justice issues.

Interpretation of Findings

No statistically significant differences were found between students' attitudes and behaviors regarding eco-justice issues in middle school and high school. This may be explained by the fact that the questionnaire included questions that applied equally to both middle school and high school students. The questions were not specific to one group or the other. Therefore, the questions on attitudes and behaviors of the students in both groups were generalized.

Limitations

The following limitations are acknowledged for this study. This study was conducted in two private Eco-Schools in Puerto Rico; therefore, the findings may not be generalizable to other public or private schools in either Puerto Rico or the United States. One of the issues associated with ESD is that a specific model is lacking due to it being an initiative that must consider many factors unique to the students, schools, and communities. Moreover, the sample for this study was limited to 7 through 12th grade. While students at lower grade levels may be practicing some of the principles of Eco-Schools, the findings were not applicable to students in these grades.

Recommendations for Future Research

To follow up on this study, I would recommend conducting research that addresses the limitations of this study. Research needs to be conducted controlling for knowledge of students

participating in the Eco-Schools Program from grades K-12 taking into account performance-based factors rather than the use of a questionnaire as the instrument. A mixed-methods design can be used to integrate observations on the parents and community. Another recommendation is to conduct additional empirical inquiry, especially for Puerto Rico, about the role ESD plays with a focus on eco-justice issues in developing life-long skills.

Other areas suggested for further study:

1. Research needs to be conducted using parents, teachers, administrators, and community members to determine if they form an integral part of the school environment by providing workshops on sustainability and the eco-school program.
2. A study is needed to determine the willingness of students to participate as volunteers in the community as part of the Eco-Schools Program to determine if they are applying to real life what they have learned as part of their education.
3. As the study findings did not provide evidence of statistically significant differences in the students, research should be conducted to develop a new survey that is more sensitive to the students' knowledge, attitudes, and behaviors towards Eco-justice in the community.
4. Researchers need to study teacher's attitudes toward including Eco-justice as part of their curriculum in elementary, middle, and high school. This research should use a mixed methods design to obtain both quantitative and qualitative information that could promote the inclusion of Eco-justice issues in all schools.

Several other factors might describe why few significant differences were found between middle school and high school. Three areas discussed here bring up questions that may lead to research that clarifies the issues addressed in this dissertation: (a) Home Environment, (b) Eco-

Schools Curriculum, (c) School Location.

Home Environment. It would be interesting to question the parents' knowledge regarding eco-justice issues and their willingness to participate in the attitudes and behaviors their children have with regards to the environment. Can the parent relate to and participate in the learning their child is receiving at the eco-school? What level of education do the parents have? Are there other siblings in the home and are these also attending eco-schools? Do the parents have similar attitudes and behaviors addressed in the questionnaire? Do they take action by contacting their politicians to address an environmental issue? Are parents involved in community projects? Are the parents interested in their child's interest and participation? Are the parents a good example for the children to become life-long learners and agents of change?

Eco-Schools Curriculum. One possible reason the study did not find significant differences in attitudes and behaviors may have been a result of how the curriculum is being taught by the individual teachers. A study on how teachers in the eco-schools are teaching the curriculum to describe the differences in teaching methods can determine if teachers in both groups are using similar strategies even though there is an age difference. In addition, observations of classroom activities and a review of the teachers' lesson plans to examine particular areas of the curriculum might explain students' answers on the questionnaire. Another area to examine is how the eco-schools are following the seven steps required by the Eco-Schools Program. Is this process being supervised by the teacher or the administration? Are the students elected or assigned to work in the different areas required in the seven steps? How willing to cooperate/volunteer are the students?

School Location. The community is the laboratory used by the eco-schools for the children to be able to apply the knowledge received in the classroom to help solve the problems

being faced in the community. For this reason, when a school decides to become an eco-school, the seven steps will outline the work the students will take on in the community. This process is done by the students elected to direct the work. Observations might describe how this process takes place. Is the student allowed to study independently as well as joining a group or subject they are interested to work with during the school day then applying that learning to the problems in the community? Do the parents, teachers, administrators, and community members form an integral part of the school environment by providing teacher, parent, and administrator training workshops on sustainability and systemic pedagogy available free-of-charge in order to have knowledge of the eco-school program? Are all involved in the school able to share and exchange the products produced in the school garden and, are businesses throughout the community able to purchase them at a minimal price? These are important factors involved the curriculum for Education for Sustainable Development (ESD) implemented by the Eco-Schools Program in Puerto Rico.

Closing Thoughts

There are several things I would take into consideration if I were to begin this study anew. One of the most important would be to use a different research design which would allow the study to have different methods. In working with these students, I realize that there are many areas which would help understand the process these students go through in eco-schools. Two areas are:

1. The relationship the students develop between themselves and the environment.
2. How the knowledge gained by students participating in the Eco-Schools Program provides them tools to become agents of change throughout their lives.

Addressing the first area, pedagogy and curriculum development encourages students to identify effects of social and ecological problems where they live (Bowers 1997, 2001; Martusewicz et al., 2015). When they mature and become citizens, they acquire the knowledge and skills needed to become agents of change to manage the interconnectedness between people and the environment. The negative relationship with nature is one of dominion and control that exists between humans and nature, might subside (Winograd, 2016).

Addressing the second area mentioned above, ESD may be part of the solution for the present ecological crisis, as well as for creating critical thinkers who will know how to make informed decision in becoming the agents of change society needs. ESD takes many forms throughout the world (McKeown, 2002) for this reason the curriculum must take many factors into consideration for example, culture, location, community, among others. However, when incorporated into an interdisciplinary curriculum, this pedagogy allows the student to learn or build on what they have learned previously in the classroom and apply it to areas of their lives. Citizens then develop the understanding that it is their responsibility to conserve and protect the environment for future generations to be able to do the same.

APPENDIX A: SURVEY

ECO-SCHOOL QUESTIONNAIRE

Elsie Aquino

May 7, 2018

Part I - Demographics

How old are you? (Under 12 years old) (13 to 18 years old) _____

What is your gender?

- Male
 Female

What grade are you in?

How long have you been in your present school? _____

1	2	3	4	5	
False	More False Than True	Not Sure	More True Than False	True	
Place a check mark in the column that most matches your feelings on the following items					
1. It makes me happy when people recycle used bottles, cans, and papers.	1	2	3	4	5
2. One of my favorite activities in school is going out to the community to find ways to protect our water.					
3. Students should study about the environment to learn to protect it.					
4. I asked my parents to use rain water to clean the floors at home.					
5. I would be willing to give \$15. of my money to help protect wild animals.					
6. Three things green alternatives use is the sun, wind, and water which do not damage the environment					
7. I have asked my parents to build a well next to our house.					
8. Solar energy is best for the environment.					
9. Environmental problems are a threat to all living things on the planet.					

1	2	3	4	5
False	More False Than True	Not Sure	More True Than False	True
Place a check mark in the column that most matches your feelings on the following items				
10. The most dangerous to the earth's environment is over population.				
11. It is important for human beings not to depend on fossil fuel.				
12. Green alternatives do not take anything out of the environment like mining does.				
13. I like to work in the garden at school because I learn about agriculture and I can share what we grow in school with my family.				
14. I asked my parents to use solar energy to help with Climate change.				
15. To save energy, I turn the light off in my house when it is not in use.				
16. I turn off the faucet while I brush my teeth.				
17. I would be willing to separate my family's trash for recycling.				
18. Human activities increase the amount of greenhouse gases on earth.				
19. I am willing to plant trees instead of cutting them down.				
20. The use of electricity and cars have changed the way we live.				
21. Climate change is mainly caused by human beings.				
22. It is important for everyone to learn about climate change.				
23. To save energy I sometimes turn the air conditioning down.				
24. At home we only buy food we know we will use.				
25. Animals alive today are most likely to become extinct because the habitat where they live is destroyed.				
26. I am willing to work on a publication that addresses the problem of Climate change.				
27. Sunlight, wind, rain, and waves are forms of renewable energy.				
28. To save water, I close the sink faucet while I brush my teeth.				
29. Most pollution of our water sources is caused by chemical runoff from farms.				

1	2	3	4	5
False	More False Than True	Not Sure	More True Than False	True
Place a check mark in the column that most matches your feelings on the following items				
30. When I see garbage at the beach I put it in the trash.				
31. I have asked my parents not to buy products made from animal fur.				
32. I rather buy food at the marketplace instead of the supermarket.				
33. Pest Management practices are taught in my science class in school.				
34. I want to work in a job that preserves and restores the environment.				
35. I would be willing to go house to house to ask people to recycle.				
36. To save water, I turn the water off while I don't need it in the kitchen.				

APPENDIX B: PARENTAL PERMISSION/RESEARCH INFORMED CONSENT

Title of Study: The Relationship between Knowledge, Behaviors, and Attitudes of Middle and High School Students in Eco-Schools in Puerto Rico

Principal Investigador (PI): Elsie Aquino
P. O. Box 1415, Juncos, PR 00777
787.310.4378

Purpose

You are being asked to allow your child to be in a research study of Eco-Schools in Puerto Rico because he/she is a student at a private school that uses the education for sustainable development (ESD). This study is being conducted at Wayne State University and at your child's school. The estimated number of study participants to be enrolled at the two schools is about 102. **Please read this form and ask any questions you may have before agreeing to allow your child to be in the study.**

In this research study, the purpose is to describe the difference between middle and high school students in two Eco-Schools in Puerto Rico regarding their behaviors, attitudes, and knowledge of Eco-Justice issues.

Study Procedures

If your child agrees to take part in this research study, he/she will be asked to complete a survey that will measure his/her behavior, attitudes, and knowledge of Eco-Justice issues. Sample items on the survey include:

- To save water, I would be willing to use less water when I bathe
- To save energy, I would be willing to use dimmer lights
- I have put up a birdhouse near my house

A sample of a knowledge question is:

Ecology assumes that human beings are what part of nature?

- special
- related to all other parts
- not important
- the best part
- the first part

The survey should not take more than 15 to 30 minutes to complete.

Benefits

There may be no direct benefit for your child; however, information from this study may benefit other children and society in the future.

Risks

There are no known risks at this time to participation in this study.

The following information must be released/reported to the appropriate authorities if at any time during the study there is concern that: child abuse or elder abuse has possibly occurred,

There may also be risks involved from taking part in this study that are not known to researchers at this time.

Alternatives

There are no alternatives to completing the survey.

Study Costs

Participation in this study will be of no cost to you.

Compensation

You or your child will not be paid for taking part in this study.

Confidentiality

All information collected about your child during the course of this study will be kept confidential to the extent permitted by law. Your child will be identified in the research records by a code name or number. Information that identifies your child personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.) may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your child's identity.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You have the right to choose not to allow your child to take part in this study. If you decide to allow your child to take part in the study you can later change your mind and withdraw from the study.] You and/or your child are free to only answer questions that you want to answer. You are free to withdraw your child from participation in this

study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you or your child are entitled to receive.

Questions

If you have any questions about this study now or in the future, you may contact Elsie Aquino or one of her research team members at the following phone number 787.310.4378. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Consent to Participate in a Research Study:

To voluntarily agree to have your child take part in this study, you must sign on the line below. If you choose to have your child take part in this study, you may withdraw them at any time. You are not giving up any of your or your child's legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

 Name of Participant

 Date of Birth

 Signature of Parent/ Legally Authorized Guardian

 Date

 Printed Name of Parent Authorized Guardian

 Time

 *Signature of Parent/ Legally Authorized Guardian

 Date

 *Printed Name of Parent Authorized Guardian

 Time

 **Signature of Witness (When applicable)

 Date

 Printed Name of Witness

 Time

* Both parent's signatures should be obtained however both are **required** for level 3 studies

APPENDIX C: ADOLESCENT ASSENT FORM

Documentation of Adolescent Assent Form

(Ages 13-17)

Title: The Relationship between Knowledge, Behaviors, and Attitudes of Middle and High School Students in Eco-Schools in Puerto Rico

Study Investigator: Elsie Aquino Gonzalez

Why am I here?

This is a research study. Only people who choose to take part are included in research studies. You are being asked to take part in this study because of your participation in the Eco-Schools Program. Please take time to make your decision. Talk to your family about it and be sure to ask questions about anything you don't understand.

Why are they doing this study?

This study is being done to find the relationship between participation in Education for Sustainable Development and the behaviors, attitudes, and knowledge towards Eco-Justice issues of students in private middle and high schools in two Eco-Schools in Puerto Rico.

What will happen to me?

You will be given a questionnaire to answer questions regarding your behaviors, attitudes, and knowledge of eco-justice issues.

How long will I be in the study?

You will be in the study for 30 minutes only once.

Will the study help me?

- You may not benefit from being in this study; however, information from this study may help other people in the future by having ecological education implemented in the schools.
- You may benefit from being in this study by reflecting on the knowledge you have with regards to the interconnectedness humans and nature have “Information gained from this study may help other people in the future by teaching them critical thinking skills to be able to become agents of change.

Will anything bad happen to me?

There will be no risk involved for you in participating in this study.

Will I get paid to be in the study?

You will receive a small gift for taking part in this research study.

Do my parents or guardians know about this?

This study information has been given to your parents/guardian. You can talk this over with them before you decide.

What about confidentiality?

Every reasonable effort will be made to keep your records and/or your information confidential; however we do have to let some people look at your study records. We will keep your records private unless we are required by law to share any information. The law says we have to tell someone if you might hurt yourself or someone else. The study doctor can use the study results as long as you cannot be identified.

The following information must be released/reported to the appropriate authorities if at any time during the study there is concern that:

- child abuse or elder abuse has possibly occurred,
- you have a reportable communicable disease (i.e., certain sexually transmitted diseases or HIV)
- you disclose illegal criminal activities, illegal substance abuse or violence

What if I have any questions?

For questions about the study please call Elsie Aquino Gonzalez at 787 310 4378. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Do I have to be in the study?

You don't have to be in this study if you don't want to or you can stop being in the study at any time. Please discuss your decision with your parents and researcher. No one will be angry if you decide to stop being in the study.

AGREEMENT TO BE IN THE STUDY

Your signature below means that you have read the above information about the study and have had a chance to ask questions to help you understand what you will do in this study. Your signature also means that you have been told that you can change your mind later and withdraw if you want to. By signing this assent form you are not giving up any of your legal rights. You will be given a copy of this form.

Signature of Participant (13 yrs. & older)

Date

Printed name of Participant (13 yrs. & older)

****Signature of Witness (When applicable)**

Date

Printed Name of Witness

Signature of Person who explained this form

Date

Printed Name of Person who explained form

** Use when participant has had consent form read to them (i.e., illiterate, legally blind, translated into foreign language).

APPENDIX D: CORRESPONDENCE



SCHOOL PERMISSION TO CONDUCT RESEARCH

March 15, 2018

Dear Institutional Review Board:

The purpose of this letter is to inform you that I give *Elsie Aquino* permission to conduct the research titled *A Comparison of Behaviors, Attitudes, and Knowledge Regarding Eco- Justice Issues of Middle and High School Students in Two Eco-Schools in Puerto Rico* at *Estancia Montessori de Puerto Rico, Gurabo, Puerto Rico*.

This also serves as assurance that this school complies with requirements of the Family Educational Rights and Privacy Act (FERPA) and the Protection of Pupil Rights Amendment (PPRA) (see back for specific requirements) and will ensure that these requirements are followed in the conduct of this research.

Sincerely,

Alicia M Landivar, Ed. D.
Principal

- The right of a parent of a student to inspect, upon the request of the parent, a survey created by a third party before the survey is administered or distributed by a school to a student. Any applicable procedures for granting a request by a parent for reasonable access to such survey within a reasonable period of time after the request is received.
- Arrangements to protect student privacy that are provided by the agency in the event of the administration or distribution of a survey to a student containing one or more of the following items (including the right of a parent of a student to inspect, upon the request of the parent, any survey containing one or more of such items): Political affiliations or beliefs of the student or the student's parent. Mental or psychological problems of the student or the student's family. Sex behavior or attitudes. Illegal, anti-social, self-incriminating, or demeaning behavior. Critical appraisals of other individuals with whom respondents have close family relationships. Legally recognized privileged or analogous relationships, such as those of lawyers, physicians, and ministers. Religious practices, affiliations, or beliefs of the student or the student's parent. Income (other than that required by law to determine eligibility for participation in a program or for receiving financial assistance under such program).
- The right of a parent of a student to inspect, upon the request of the parent, any instructional material used as part of the educational curriculum for the student. Any applicable procedures for granting a request by a parent for reasonable access to instructional material received.
- The administration of physical examinations or screenings that the school or agency may administer to a student.
- The collection, disclosure, or use of personal information collected from students for the purpose of marketing or for selling that information (or otherwise providing that information to others for that purpose), including arrangements to protect student privacy that are provided by the agency in the event of such collection, disclosure, or use.
- The right of a parent of a student to inspect, upon the request of the parent, any instrument used in the collection of personal information before the instrument is administered or distributed to a student. Any applicable procedures for granting a request by a parent for reasonable access to such instrument within a reasonable period of time after the request is received.



Inter American University of Puerto Rico
Metropolitan Campus
Office of the Chancellor

March 9, 2018

Mrs. Elsie Aquino González
Graduate Student
Curriculum & Instruction K-12 Program
College of Education
Wayne State University
Detroit, Michigan

Dear Mrs. Aquino:

I authorize you to conduct the study entitled: *A Comparison of Behaviors, Attitudes, and Knowledge Regarding Eco-Justice Issues of Middle and High School Students in Two Eco-Schools in Puerto Rico*, with the understanding that it will be submitted to the Institutional Review Board (IRB), of the Interamerican University of Puerto Rico. I acknowledge that your research methodology intends the voluntary participation of students between seventh and eleventh grade from our "Escuela Laboratorio CEDIN". Thus, of IRB approval is granted, you will have access to conduct the proposed research study in our school. In addition, we will require a copy of the dissertation results.

I wish you success in your dissertation process.

Cordially,

A handwritten signature in black ink, appearing to read "Marilina L. Wayland".

Marilina L. Wayland
Chancellor

APPENDIX E: WAYNE STATE UNIVERSITY INSTITUTIONAL REVIEW BOARD APPROVAL

**WAYNE STATE
UNIVERSITY**

IRB Administration Office
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
<http://irb.wayne.edu>

NOTICE OF EXPEDITED APPROVAL

To: Elsie Aquino
Teacher Education
5424 Gullen Mall - 2nd Floor -

For: Dr. Deborah Ellis or designee S. Millis, Ph.D / SC
Chairperson, Behavioral Institutional Review Board (B3)

Date: May 10, 2018

RE: IRB #: 043818B3E
Protocol Title: THE RELATIONSHIP BETWEEN KNOWLEDGE, BEHAVIORS, AND ATTITUDES REGARDING ECO-JUSTICE ISSUES OF MIDDLE AND HIGH SCHOOL STUDENTS IN ECO-SCHOOLS IN PUERTO RICO

Funding Source:
Protocol #: 1804001359

Expiration Date: May 09, 2021

Risk Level / Category: 45 CFR 46.404 - Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review Category (#7)** by the Chairperson/designee for the Wayne State University Institutional Review Board (B3) for the period of 05/10/2018 through 05/09/2021. This approval does not replace any departmental or other approvals that may be required.

- Revised Protocol Summary Form (revision received in the IRB Office 05/4/2018)
- Research Protocol (received in the IRB Office 04/10/2018)
- Medical records are not being accessed therefore HIPAA does not apply
- A waiver of written documentation of consent has been granted according to 45CFR 46 117(c) and justification provided by the Principal Investigator in the Protocol Summary Form. This waiver satisfies: 1) risk is no more than minimal, 2) That the research involved no procedures for which written consent is normally required outside the research context 3) The consent process is appropriate, 4) An information sheet disclosing the required and appropriate additional elements of consent disclosure will be provided to participants.
- Parental Information Sheet with "Decline Option" (revision dated 04/26/2018)
- Behavioral Documentation of Adolescent Assent ages 13-17 (revision dated 05/04/2018)
- Data Collection Tool (1): ECO-School Questionnaire.
- Please note: This submission was reviewed under the IRB Administration Office Flexible Review and Oversight Policy, therefore the expiration date is 05/09/2021.

- * Federal regulations require that all research be reviewed at least annually. You may receive a "Continuation Renewal Reminder" approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval **before** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.
- * All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.
- * Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (<http://www.irb.wayne.edu/policies-human-research.php>).

NOTE:

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ABSTRACT**THE RELATIONSHIP BETWEEN KNOWLEDGE, ATTITUDES, AND BEHAVIORS
REGARDING ECO-JUSTICE ISSUES AMONG MIDDLE AND HIGH SCHOOL
STUDENTS IN ECO-SCHOOLS IN PUERTO RICO**

by

ELSIE AQUINO**December 2018**

Advisor: Dr. Thomas Edwards

Major: Curriculum and Instruction

Degree: Doctor of Philosophy

The conservation, preservation, and protection of the environment are responsibilities that must be globally shared by human beings to “meet the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development (WCED, 1987, p. 43). When citizens acquire the knowledge and skills needed to become agents of change, the lack of interconnectedness – a relationship to nature as one of dominion and control – that presently exists between humans and nature might subside (Winograd, 2016). Through the re-orientation of the present educational system and the development of curricula that addresses the present day environmental crisis, citizens can become aware of the need to work together towards sustainability (The United Nations Decade of Education for Sustainable Development (UNDESD, 2005-2014).

AUTOBIOGRAPHICAL STATEMENT

ELSIE AQUINO

Education

2018 – Doctor of Philosophy

Wayne State University, Detroit, MI

Major: Curriculum and Instruction

2013 – Master of Arts

Wayne State University, Detroit, MI

2011 – Bachelor of Film Studies

Hunter College, CUNY, New York