SUPERINTENDENT LEADERSHIP AND ENVIRONMENTAL SUSTAINABILITY

IN NEW YORK STATE PUBLIC SCHOOLS

A Doctoral Research Project
Presented to
Doctoral Committee Chair Raymond O'Connell, Ed.D.
Esteves School of Education
The Sage Colleges

In Partial Fulfillment of the
Requirements for the
Degree of Doctor of Education
In Educational Leadership

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October 8, 2013

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Jennifer Spring   Date of Signature

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Raymond O'Connell   Date of Signature
Doctoral Research Committee Chair

DEDICATION

This dissertation is dedicated to my dear sister Mary who was diagnosed with Stage IV breast cancer when I began this research. She continually served as my inspiration.

"Let It Be"

When I find myself in times of trouble, Mother Mary comes to me

Speaking words of wisdom, let it be

And in my hour of darkness she is standing right in front of me

Speaking words of wisdom, let it be

Let it be, let it be, let it be, let it be

Whisper words of wisdom, let it be

And when the night is cloudy there is still a light that shines on me

Shine until tomorrow, let it be

I wake up to the sound of music, Mother Mary comes to me

Speaking words of wisdom, let it be

Let it be, let it be, let it be, yeah, let it be

There will be an answer, let it be

Let it be, let it be, let it be, yeah, let it be

Whisper words of wisdom, let it be

The Beatles, John Lennon and Paul McCartney

ACKNOWLEDGEMENTS

This dissertation was written at a time of personal difficulties and I would like to acknowledge numerous people who encouraged me, inspired me and challenged me to produce my best work.

First and foremost, Dr. Ray O'Connell, my Dissertation Chair, provided me with all of the necessary tools to be successful on this journey. He encouraged me to reflect more deeply on my work and was always available to guide me and provide me with timely feedback. His expertise in quantitative research allowed me to fully understand the research process and to gain a great appreciation for analyzing data.

I am grateful to all of the amazing professors of the Sage Colleges' Esteves School of Education's Doctoral Program, especially to Dr. Robert Bradley who encouraged me to enter the Sage program, and Dr. Ann Myers whose guidance and profound wisdom helped me to become a better leader and a deeper thinker. My executive coach, Dr. Ruth Kellogg, provided continual support and reassurance, which helped me to remain focused and maintain my enthusiasm throughout the program. Dr. Angelina Bergin provided valuable feedback on the final copy. All of my cohort members inspired me and enriched my experience in the program; I especially want to thank Kathleen, Mark and Maureen. I am humbled by so many who took the time to make such a contribution to my life during my time at Sage. I will remember to pay this forward so I too can promote authentic leadership in others at a critical juncture in time.

I am indebted to the New Hartford School District – my staff and colleagues who were so supportive of me while I was immersed in my studies and the writing of this dissertation.

ABSTRACT

What has not been studied to any great degree are superintendent perceptions of environmental sustainability and the extent to which superintendents in New York State believe they have led their districts in integrating environmental sustainability into district structures, policies and practices. This exploratory study investigated superintendent self-reported participation in leadership strategies and leadership actions that support environmental sustainability (ES) as well as the influence of a superintendent's knowledge, value, and priority of ES. A researcher-developed online survey was emailed through Survey Monkey to all New York State superintendents, excluding those working in New York City, and resulted in a 19% response rate.

The data revealed that superintendents did not view themselves as highly knowledgeable of ES. While the majority of superintendents held ES as a high value, it was not enough to get them to lead their districts in strategies and actions that supported ES. The key driver for influencing superintendents to lead their districts in strategies and actions was whether or not ES was considered a high priority. The data indicated that the leadership capacity for making the transition to ES is missing and that the link among knowledge, value and priority, or their collective synergy of leadership capacity, are the keys to moving ES forward in New York State. Increasing superintendent capacity to lead environmental sustainability in New York State's public school districts is paramount. The results of this study will be of interest to public school system leaders and policymakers.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I: INTRODUCTION

The second decade of the 21st century finds society grappling with a multitude of global issues relating to the environment, the economy and education. The three E's together formulate challenges so great that solutions will require innovations, new ways of thinking and a collective sense of social responsibility. Reducing one's environmental footprint through renewable sources or energy efficient options, conservation efforts, and the reduction of waste are critical elements in creating a more environmentally sustainable and resource-conscious society. Solutions call for a new type of leader – one who creates systems, leads change and adapts policies to support environmental sustainability. The barriers to sustainability lay in the choices that people and organizations make every day. How will society respond to these immense challenges? Will we choose to cling to and protect the ways of the past dooming us to an uncertain future? Or, will we join together in changing our mental models to create a different destiny? As caretakers of children and architects of their futures, school districts play a crucial role in helping to build a more environmentally sustainable world. School district leaders are in a pivotal position to impact a positive outcome.

Statement of the Problem

What has not been studied to any great degree are superintendent perceptions of environmental sustainability and the extent to which superintendents in New York State believe they have led their districts in integrating environmental sustainability into district structures, policies and practices. This exploratory study investigated superintendent self-reported participation in leadership strategies and leadership actions

that support environmental sustainability as well as the influence of a superintendent's knowledge, value and priority of environmental sustainability.

According to the United States Department of Energy (n.d.), as much as 30 percent of a district's total energy consumption is used inefficiently or unnecessarily. The United States Environmental Protection Agency (2011) approximated that the nation's 93,000 K-12 schools spend $8 billion annually on energy, second only to teacher salaries and more than was spent nationwide on books, supplies and equipment. They advised that an estimated $2 billion of that could be saved by improving energy efficiency in K-12 schools (US EAP, 2011). As the world's natural resources and school district funds become increasingly scarce, district leaders are compelled to reduce costs associated with the use and consumption of both energy and natural resources. Through these efforts, schools have the opportunity to reduce costs, have a positive impact on the environment and allow for savings to be directed to other district priorities.

As Senge, Smith, Kruschwitz, Laur, & Schley (2008, p. 9) stated in *The Necessary Revolution*, "There is no viable path forward that does not take into account the needs of future generations." The Brundtland Report, (United Nations, 1987) is credited for introducing the term 'sustainable' to the world and for providing the seminal definition in the report, *Our Common Future* (1987, p.8), "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their needs." This Report marked the beginning of humanity's voyage to collectively solve the greatest social, economic and environmental problems ever to be confronted. Twenty-six years after the Brundtland Report was released, President Obama reiterated the message in his

inauguration speech, " We, the people, still believe that our obligations as Americans are not just to ourselves, but to all posterity. We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations" (Barack Obama Inauguration Speech, 2013). Twenty-six years after the Brundtland Report, little progress has been made. Scientists warn that time is running out and with each passing year, the impact and risk of harm to humans, communities, and ecosystems become more acute (Intergovernmental Panel on Climate Change, 2007). It is time that schools lead the way to reduce their ecological footprint (Wackernagel & Rees, 1996), allow for the preservation of natural resources, and significantly limit CO_2 emissions. It can make a difference, since with every kilowatt of electricity saved roughly 1.6 pounds of carbon dioxide are prevented from entering the atmosphere (Hawkes, 2010). According to a study conducted by the New York Power Authority (NYPA), capturing all of the economic energy efficiency potential at both public and private schools throughout New York State could reduce annual CO_2 emissions by as much as 1.4 million metric tons, or the equivalent of taking roughly 300,000 cars off the road each year (Optimal Energy, 2013).

Some superintendents are already heeding this call and realizing substantial savings in the process by reducing energy consumption and making energy efficient upgrades to their facilities utilizing the services of energy education companies as well as financing options through energy performance contracting (EPC). The Mount Sinai School District on Long Island recently reported saving $350,000 annually on utility bills through the conservation efforts of students and staff by using reminders to turn off computers, printers, lights and air conditioners when not in use (Hu, 2011). The

11

Queensbury School District north of Albany recently won a New York State Efficiency

Grant for saving hundreds of thousands of dollars on energy costs by reducing

consumption through the monitoring of usage district-wide and by making energy

decisions based on the data (Aquije, 2013). The Fonda-Fultonville Central School

District was recognized by Energy Star (US EPA, 2013) as the first public school district

in New York State to produce 100% of its own electricity completely independent of its

utility company by the establishment of a cogeneration plant with full back-up power.

The Ithaca City School District recently became the first district in New York State to be

recognized by the New York State Energy Research and Development Authority

(NYSERDA) and the New York State Education Department (NYSED) for having two

verified school buildings by the New York Collaborative of High Performance Schools

(NY-CHPS) (Peters, 2013).

While pockets of school districts across New York State have implemented more

environmentally sustainable practices, little information has been gathered statewide that

fully explores the role superintendents are playing in leading a comprehensive approach

to environmental sustainability. Exploring this question through self-reported data adds

to the limited body of knowledge on this topic and will help to inform leaders – from

school districts to governmental agencies –on the level of participation of environmental

sustainability in public school districts in New York State and the extent that

superintendents are leading these efforts.   This study also provides recommendations for

practices and initiatives that should be considered by both school district leaders and

policymakers.

Purpose of the Study

       This quantitative study, which questioned superintendents through an online survey using Survey Monkey, was designed to investigate superintendent perceptions of environmental sustainability and the extent to which New York State public school superintendents believe they have led their districts in integrating environmental sustainability into district structures, policies and practices. This exploratory study investigated superintendent self-reported participation in leadership strategies and leadership actions that support environmental sustainability as well as their relationship to a superintendent's knowledge, value and priority of environmental sustainability. The Wheel of Change Toward Sustainability Model, developed by Doppelt (2003, 2010), was used as the lens to assess the extent to which superintendents believe they have incorporated environmental sustainability measures into district structures, policies and practices. Theories of adaptive leadership (Bennis, 2007, 2008; Heifetz, 1994; Heifetz, Grashow, & Linsky, 2009; Scharmer, 2007; Scharmer & Kaufer, 2013), systems thinking (Satterwhite, 2010; Senge, 2001, 2008) pro-environmental behavior (Ajzen & Fishbein, 1980; Blake, 1999; Kollmuss & Agyman, 2002; Leiserowitz, Kates, Parris, 2006) and environmental sustainability (Dunphy, Griffiths, & Benn, 2007; Esty & Winston, 2009; Goodland, 1995; Hawken, Lovins & Lovins, 2010). Judkoff, 2012; McDonough & Braungart, 2002; Morelli, 2011; Senge et al., 2008; Spoolman & Miller, 2009; U.S. Department of Energy, n.d.; U.S. Environmental Protection Agency, 2011; Wackernagel and Rees, 1996) were also applied to this study.

Research Questions

This study was designed to address the following questions regarding superintendent leadership and school district environmental sustainability efforts in New York State.

1. How do superintendents in New York State view environmental sustainability?

2. To what extent do superintendents believe they have applied leadership strategies, leadership actions, and accessed available resources in support of environmental sustainability?

3. What is the relationship between leadership attributes (knowledge, value and priority of environmental sustainability) and leadership strategies within the context of environmental sustainability?

4. What is the relationship between leadership strategies and leadership actions within the context of environmental sustainability?

5. What is the impact of demographics on leadership attributes, strategies and actions?

Significance of the Study

Little research exists that specifically investigates superintendent leadership within the context of environmental sustainability in pubic schools. This study provides insight regarding the perceptions that school district leaders possess regarding environmental sustainability. It also provides an awareness of superintendent self-reported participation levels in leadership strategies and leadership actions that support environmentally sustainable practices in school districts across New York State. These findings will also allow policymakers to determine how best to support system leaders so

they may be able to lead their districts forward in making the transition to environmental sustainability. It is important that system leaders provide leadership for environmental sustainability at a critical juncture in time.

Why environmental sustainability matters. The planet is getting warmer. Surface temperature data for Earth as a whole, including readings over both land and ocean, show an increase of about 0.8°C (1.4°F) over the period 1901─2010 and about 0.5°C (0.9°F) over the period 1979–2010 (American Meteorological Society, 2012). The World Meteorological Society (2011) reports that 13 of the past 15 years are among the warmest since 1850, with 2005 and 2010 being the warmest two years on record. Arctic ice is rapidly disappearing, and the Arctic Ocean could be free of ice during the summer by 2015 (L. Brown, 2011). As the Arctic ice melts, less sunlight will be reflected back into space causing the region to heat up at even faster rates. Scientists affirm that as the Earth warms, droughts, floods, heat waves and other extreme weather events will occur more frequently. What was once dubbed the "storm of the century" has already become a frequent phenomenon. A consensus has emerged among scientists that climate change is a result of an increase in the average surface temperatures that has caused changes in precipitation patterns, the acidity of the oceans, and the rise in sea levels since the industrial revolution (Blunden & Arndt, 2012). Scientists project that the global average surface temperature will continue to rise by at least several degrees, which will have catastrophic consequences (Parry, Canziani, Palutikof, van der Linden & Hanson, 2007). A recent projection by the World Bank showed temperatures on track to rise by up to 7.2 degrees Fahrenheit (4 Celsius) by the year 2100 (Ritter & Casey, 2012). Heavy precipitation events are expected to increase. The sea ice at both poles will continue to

shrink and raise the level of the oceans. In a recent study, climate scientists Schaeffer, Hare, Rahmstorf and Vermeer (2012), warn that no matter how quickly carbon emissions are reduced, it is unlikely to keep the seas from rising less than five feet. In another study, Dutton and Lanbeck (2012) used history as a model for projecting the future and found that the warm-period before the last ice age resulted in sea levels rising roughly 20 to 30 feet higher than those of today. In either scenario, there is reason to be extremely alarmed.

Widespread agreement exists among the global scientific community that it is "extremely likely" that human activities are responsible for increases in carbon dioxide and other greenhouse gases connecting their buildup to documented increases in global average temperatures (Intergovernmental Panel on Climate Change, 2013). The burning of fossil fuels and forests, as well as the changing land use from both deforestation and agriculture are the sources of greenhouse gases (Marquis & Tans, 2012). Current atmospheric levels of carbon dioxide, methane, and nitrous oxide greatly exceed their pre-industrial levels, at least those that existed for hundreds of thousands of years previously (Marquis & Tans, 2012). Scientists admonish that to avoid the worst impacts of climate change society needs to act quickly to transform its energy system into one that is environmentally sustainable – one that reduces the emissions of CO_2 with the goal of obtaining zero emissions. This may be difficult to achieve as global emissions of carbon dioxide jumped by the largest amount on record in 2010 (International Energy Agency, 2012). The U.S. Energy Information Administration (2013a) predicts that the world's demand for energy will increase by more than 56% in the next 30 years. As the emerging economies of China and India continue to grow along with their demand for

fossil fuels, the possibility of emissions continuing to increase is almost certain. The

number of cars in China and India is predicted to rise from 17 million in 2006 to 1.1

billion by 2050 (Esty & Winston, 2006). Roughly 55% of oil used world-wide is for

transportation, and the recent growth of the automobile sector in developing countries is

making further demands on this fuel (Arunachalam & Bharadwaj, 2012).

It is not only the overuse of fossil fuels that is cause for concern. Two-thirds of

ecosystem services on which human society depends are being degraded or used in ways

that cannot be sustained (Worldwatch Institute, 2006). In their landmark book,

Ecological Footprint, Wackernagel and Rees (1996), reported that human consumption,

or the measure of one's load, was roughly 30% more than the Earth's carrying capacity.

The authors warned that if people around the world consumed the way Americans do,

three more planets would be necessary to provide the resources needed to sustain them.

Their original study was conducted based on the consumption and waste patterns for the

year 1996. As America has set the standard for all future consumers to emulate, one must

wonder 22 years later, how many more planets would be needed to support the global

citizen of 2013?

The United Nations Secretary-General Ban Ki-moon warned at the UN sponsored

Doha Climate Talks in Qatar in 2012 that there may only be a small window of

opportunity open to change humanity's trajectory so that significant devastation may be

avoided (Harrabin, 2012).

Why it matters for schools. According to the report, *Can't Get There From

Here: A Survey on School Fiscal Matters* (New York State Council of School

Superintendents, 2012), 52% of New York State superintendents reported that their

district's financial condition was worse or significantly worse than the previous year. The report indicated that this was the second year in a row where the majority of superintendents had reported a deteriorating financial situation for their school districts. School districts' declining financial conditions were exacerbated by the implementation of a property tax cap levy where 67% of superintendents said it forced their districts to adopt a spending level below what they would have done otherwise, further eroding instructional programs (New York State Council of School Superintendents, 2012). In addition to cuts in the educational program, the report indicated that more than 50% of superintendents also stated that they adopted a budget that had a negative impact on operations and maintenance. Princeton Energy Resources International (2004) reports that O&M spending per student is at its lowest level in 30 years, causing many buildings and their equipment to be poorly maintained leading to greater energy inefficiencies. This can impact energy costs as the U.S. Department of Energy's Federal Management Program (FEMP) (2010) contends that an efficiently run operations and maintenance program in a school district can save 5-20% annually on energy bills without any significant capital investment. It is clear that not enough help will be on the way to rescue school districts from the devastating effects of budget shortfalls. This situation calls for school districts and communities to be innovative when looking to the future. The experts agree that leading one's organization sustainably is a guarantee that the organization will benefit financially from the stronger focus on internal operations, as minimizing waste and inefficiencies will instantly result in cost reductions (Hart & Milstein, 2003).

New Yorkers pay the highest average utility rate in the continental United States at 18.31 cents per kilowatt hour (kWh) of electricity versus the national average of 11.76 cents per kilowatt hour (U.S. Energy Information, 2013b). Since utilities are the second largest budget item after personnel related items, reducing costs associated with energy consumption can significantly impact school district budgets (U.S. Department of Energy, n.d.). When one considers that roughly 30% of the energy used in a typical school is wasted due to inefficient systems, operations and the mindless habits of building occupants – a loss for both the environment and the school district – achieving greater efficiency in our nation's school buildings must be approached with urgency (U.S. EPA, 2011).

There is reason to be optimistic as some K-12 schools nation-wide have been able to reduce energy costs by as much as 35 percent in existing facilities by implementing energy efficiency measures and by encouraging pro-environmental behaviors of building occupants (U.S. EPA, 2011). The New York Power Authority (NYPA) reports that its Energy Services for Schools Program has assisted roughly a third of New York State's schools and has saved them $37 million annually on their utility bills (Optimal Energy, 2013). According to the EPA, modification of a pre-existing building for energy efficiency through a retrofit can save a typical 100,000-square-foot school building between $10,000 and $16,000 annually, and adding simple behavioral and operational measures can increase that reduction up to 35 percent (U.S. EPA, 2011).   Studies by McKinsey & Company indicate improvements in the energy efficiency of new and existing buildings are the most cost effective way to achieve emissions reductions,

decreasing consumption of fossil fuels, and decreasing energy costs (Granade, Creyts, Derkach, Farese, Nyquist & Ostrowski, 2009).

Key Terms and Definitions

To ensure a common understanding of the concept of environmental sustainability, the focus of this study, the researcher has provided clear definitions.

Environmental Sustainability: While still an emerging field, numerous terms exist that refer to the relationship between the world's people and their impact on and relationship with the environment. The Brundtland Report *Our Common Future* (United Nations, 1987, p. 43), defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their needs." This researcher has chosen to build on the Brundtland definition and use the term environmental sustainability (Goodland, 1995; Morelli, 2011), which as a definition provides greater clarity, "meeting the resource and services needs of current and future generations without compromising the health of ecosystems that provide them" (Morelli, 2011, p. 24). Additionally, the term sustainability alone may be confusing to educators since it has been used in educational leadership to refer to the stability and longevity of programs, instructional practices, and leadership (Hargreaves & Fink, 2004). The term Green Schools, as defined by the U.S. Department of Education (2011) refer to schools that reduce energy consumption and energy costs, protect the health of building occupants, and exemplify environmentally sustainable learning spaces and educational programs to increase academic engagement. Since the concept of Green Schools does not have an explicit component, which focuses specifically

20

on leadership strategies and leadership actions required of system leaders to make

the transition to environmental sustainability, the term was not used for this study.

For the purposes of achieving greater clarity and efficiency in the text,

environmental sustainability will also be referred to as ES.

Leadership for Environmental Sustainability: Leadership for environmental

sustainability is about building a collective capacity that allows for new learning,

innovative solutions and adapted behaviors that shape the future so that the

resource and service needs of current and future generations can be met without

compromising the health of ecosystems that provide them (Goodland, 1995;

Heifetz, 1994; Morelli, 2011; Scharmer & Kaufer, 2013; Senge et al., 2008;

United Nations, 1987).

Delimitations of the Study

The scope of this study was delimited in the following ways. The population was

limited to public school districts in NYS, excluding New York City, which has a different

governance structure and is substantively different from the rest of the state. The sample

only included superintendents. Directors of operations and maintenance, superintendents

of buildings and grounds, as well as school business officials may have also provided

valuable insight to this study. However, they were not surveyed. The data were self-

reported.

Limitations

The researcher sent out the survey to superintendents in New York State

excluding New York City and had reason to believe that a total of 669 superintendents

received it and were afforded an opportunity to participate. While the initial goal was for

the survey to be sent to 696 superintendents, the opt-out feature in Survey Monkey prevented 27 superintendents from receiving the email through Survey Monkey. A total of 126 superintendents responded to the survey comprising a 19% response rate. Although sending the survey via email saved time and money, it also presented challenges. The email process may have created obstacles, including emails lost to spam, or district filters that prevented those emails from reaching the desired addresses. Since people receive an ever-increasing number of daily emails including electronic surveys, it is becoming more difficult for subjects to respond to emails including online surveys (Sheehan, 2001).

Organization of the Study

This study is divided into five chapters. Chapter I provides an introduction to the study, including the purpose of the study, the research questions that will be answered, the significance of the study including why environmental sustainability is important and why it matters for school districts, definition of terms used in the study, and the organization of the study. Chapter II provides a review of the literature on factors leading to pro-environmental behaviors, and leadership strategies and leadership actions that support environmental sustainability. Global, federal and state efforts that address environmental sustainability and their relationship to public school districts are also included. Chapter III provides the methodology used in the study, including the participants, sample size, instrumentation, design, data collection, validity, variables, and statistical approaches used in the analysis of the data. Chapter IV discusses the results of the data analysis as it relates to each of the research questions posed in this study. Chapter V is a summary of findings, conclusions, and recommendations.

CHAPTER II: REVIEW OF THE RELEVANT LITERATURE

We need leaders who can shape the issues so that people understand why ignoring them is such a threat and why rising to them is such an opportunity. We also need leaders who do not only understand the importance of dealing with this problem in a systemic way but who can actually generate the vision and authority to pull that system together. (Friedman, 2008, p. 405)

The goal of this research is to better understand the connection between superintendent leadership and environmental sustainability within the context of public schools. While numerous studies have been conducted on leading environmental sustainability in both higher education (Bardaglio & Putnam, 2009; Bartlet & Chase, 2004; Lozano, 2006) and in the corporate world (Hart & Milstein, 2003; Sharma & Vredenburg, 1998; Shrivastava, 1995), there exists limited empirical research supporting it in K-12 public school education (Bottery, 2008, 2009; Kensler, 2012; Pepper & Wildy, 2008;). The few studies that have been conducted are qualitative in nature and mostly focus on the leadership of building principals (Ackley, 2009; Schelly, Cross, Franzen, Hall and Reeve, 2010; Veronese & Kensler, 2013). This represents a critical gap in the literature as superintendents are in a pivotal position through their leadership to have a greater impact by restructuring their organizations and influencing the behaviors of others to minimize the effect on the environment. Hawken (2007) suggests that leaders must also think of their role as restorers of life where value is placed on the respect for the world and its diverse environment. Bennis (2007) affirms that exemplary leadership will make the ultimate difference in helping to address the threat of biological catastrophe currently facing the world.

President Barack Obama emphasized this call to leadership in his Second

Inaugural Address (2013).

> The path towards sustainable energy sources will be long and sometimes difficult.
> But America cannot resist this transition; we must lead it. We cannot cede to other
> nations the technology that will power new jobs and new industries – we must
> claim its promise. That is how we will maintain our economic vitality and our
> national treasure – our forests and waterways, our croplands and snowcapped
> peaks. That is how we will preserve our planet, commanded to our care by God.
> (Barack Obama Inaugural Address, 2013)

When administrators and teachers make school district decisions, it is reaffirming

that the first question generally asked is, "Is it good for kids?" Keeping students at the

center of the mission is paramount and it is now time that the mission of doing what is

best for kids be expanded so that the dialogue also includes doing what is best for the

environment. This will require system level leaders to successfully influence their

stakeholders to support a new view of district decision making to include environmental

sustainability (ES) as a central component. Leadership will make the ultimate difference.

The meaning of leadership that serves as the foundation for this study is based on

the definition by Scharmer & Kaufer (2013, p. 75), "co-creating the capacity to sense and

realize an emerging future." Creating results that nobody wants is what happens when

there is an absence of leadership (Scharmer & Kaufer, 2013). When applied to the

context of environmental sustainability, leadership is about building a collective capacity

that allows for new learning, innovative solutions and adapted behaviors that shape the

future so that the resource and service needs of current and future generations can be met

without compromising the health of ecosystems that provide them (Goodland, 1995; Heifetz, 1994; Heifetz, Grashow & Linsky, 2009a; Morelli, 2011; Scharmer & Kaufer, 2013; Senge, et al., 2008; Senge & Carstedt, 2001; United Nations, 1987).

This review investigates leadership strategies and leadership actions that support environmental sustainability and how a leader's knowledge, value and priority of ES influence pro-environmental leadership behaviors. Little research exists that specifically investigates superintendent leadership within the context of environmental sustainability in public school districts. The researcher has endeavored to formulate insight and create linkages to recommended leadership strategies and leadership actions that promote ES within an educational setting.

The review of the literature is broken down into two major sections. The first section is comprised of three parts: an investigation of the factors that lead to pro-environmental behavior, a review of leadership strategies that promote environmental sustainability, and an investigation of leadership actions that support environmentally sustainable outcomes.

The second section will focus on the global, national and New York State effort of addressing environmental sustainability and how that effort on a federal and state level supports schools.

Leadership Attributes and Pro-Environmental Behavior

Leadership begins with the individual. In their landmark book, *Results Based Leadership,* Ulrich, Zenger & Smallwood (1999) define leadership attributes to encompass what "leaders need to be, know and do" (p. 6). These authors reason that attributes formulate the "who" of leadership. The "who" of leadership influences what a

leader values, what a leader sees as a priority and ultimately, the decisions that a leader makes. The factors that influence an individual to act pro-environmentally, most notably the role of knowledge, value and priority, will be explored in this literature review. Since there is no single model for predicting environmental behavior (Kollmus & Agyeman, 2002), models from social psychology and sociology will be considered.

Knowledge. The influence of one's knowledge of the environment and whether that translates into pro-environmental behavior has been studied with surprising results. Studies indicate that possessing knowledge and awareness of the environment does not guarantee pro-environmental behavior (Kollmuss & Agyeman, 2002). Kempton, Boster and Hartley (1995) concluded that most people do not possess enough knowledge about environmental issues to act in an environmentally responsible manner. Other studies have shown that even possessing detailed technical knowledge of the environment does not increase pro-environmental behavior (Kollmuss & Agyeman, 2002). Interestingly, incentives and cultural values have been shown to motivate people to act pro-environmentally without acting out of concern for the environment (Kollmuss & Agyeman, 2002).

Festinger's (1957) theory of cognitive dissonance, where individuals unconsciously seek out information that reaffirms their current beliefs and mental frameworks, may also explain the discrepancy between knowledge and action. When applied to the environment, theorists have suggested that individuals who have an external locus of control, or feeling that their actions cannot make a difference, may avoid information about environmental issues because they may surreptitiously threaten their own underlying assumptions, values and beliefs (Rotter, 1966). Individuals with an

26

internal locus of control, who believe that life's events are a result of their own behaviors, are more motivated to act and behave pro-environmentally (Rotter, 1966).

One area that has proven to hold promise in closing the gap between knowledge and action of pro-environmental behaviors is social marketing. Social marketing is defined as the application of marketing principles and techniques to promote behavior goals relevant to the social good (Lazer and Kelley, 1973). McKenzie-Mohr (2011) reports that social marketing can be applied to promote pro-environmental behavior as it has been successful in transforming attitudes and behaviors about the dangers of smoking.

Values and actions. Values are abstract ideals that direct one's goals and frame what one considers to be of importance. (Leiserowitz, Kates, Parris, 2006). Values shape much of people's intrinsic motivations (Kollmuss & Agyeman, 2002). Studies have investigated the relationship between a person's value of the environment and whether those values are expressed as concrete actions. When a discrepancy exists between the two, theorists refer to this as a value action gap (Blake, 1999; Leiserowitz, Kates, & Parris; 2006).

Leiserowitz, Kates, & Parris (2006) conducted a meta-analyses of empirical data of public opinion surveys from North America and Europe and examined the relationship between value of the environment and concrete action. These researchers (2006) determined that there were three barriers that contributed to the value action gap. First, the study determined that global environmental values were low priorities relative to other values. Leiserowitz, Kates, Parris (2006) concluded that the strength of values that support ES remains weak and usually falls victim to other competing priorities such as an

individual's time constraints, financial situation, habits and routine, knowledge, skills, power, and perceived efficacy to translate one's value of the environment into action. Many of these barriers force people to make trade-offs. Their study also suggested that structural barriers including laws, regulations, infrastructure, available technology, social norms as well as social, economic and political interests contribute to the gap between value and action.

Rajecki, (1982), a social psychologist, defined several reasons for this discrepancy. He explained that most people experience environmental problems indirectly and are more apt to minimize the importance of participating in actions that address them since they have not been directly impacted. According to Rajecki, another cause for this discrepancy is a family's lifestyle as well as the social and cultural norms that influence a person's habits and routines.

Fishbein & Ajzen, (1975) reported that flaws in research methodology also make it difficult to design valid studies that measure and compare value and behavior. Many surveys ask questions that are broad in scope rather than asking questions that measure actions, which can lead to discrepancies in results (Newhouse, 1991). To address this issue of measurement discrepancies, Ajzen and Fishbein developed their Theory of Planned Behavior (Ajzen & Fishbein, 1980). This model, which is considered the most influential attitude-behavior model in social psychology, asserts that behavioral intention is determined by one's attitude toward performing the action and the extent to which the action is considered under one's control, or locus of control (Ajzen, 1991).

Veronese and Kensler (2013) conducted a study of school leaders' attitudes, subjective norms and perceived behavioral control beliefs on green school practices.

Through a qualitative survey approach, the authors conducted an elicitation study with 71 school leaders in the United States asking twelve open-ended questions. The Theory of Planned Behavior (Ajzen & Fishbein, 1980) was used as the theoretical framework. The authors found that participating school leaders reported benefits to going green and possessed positive attitudes regarding it. However, the participants identified substantial barriers to leading and managing green schools such as limited resources of money, time, information and personnel. Their study also suggested the need for professional development for school leaders in learning whole-school approaches to practicing, teaching and modeling sustainability.

Hines, Hungerford and Tomera (1986-87) developed their Model of Responsible Environmental Behavior based on Ajzen and Fishbein's (1980) Theory of Planned Behavior to investigate variables associated with pro-environmental behavior. Through a meta-analysis of 128 pro-environmental behavior research studies, Hines, Hungerford and Tomera (1986-87) found the following variables to be the most reflective of pro-environmental behavior: knowledge of environmental issues and the action strategies to alleviate them, and locus of control. Borden and Francis (1978) suggested that ego-centric people were less likely to engage in pro-environmental behavior, while people who have satisfied their own personal needs and were giving to others were more likely to engage in pro-environmental behavior.

In their model, Fietkau and Kessel (as cited in Kollmuss & Agyeman, 2002) used both sociology and psychology to explain pro-environmental behavior. They concluded that the use of incentives and positive reinforcement helped to reinforce and support

ecological behavior. They also found that structural factors either enabled or hindered people to act environmentally.

Blake (1999), a sociologist, based his model on three barriers to action: individuality, responsibility and practicality. After conducting 163 detailed face-to-face interviews in the United Kingdom, Blake (1999) concluded that the environmental actions that people take may be unrelated to the concerns they express about the environment. Blake (1999) asserted that this seeming contradiction was caused by one's concern for the environment being outweighed by other conflicting attitudes thus resulting in a value-action gap. He concluded that people's values are "negotiated, transitory and sometimes contradictory" (Blake, 1999 p. 265).   Responsibility, the second barrier in Blake's model, is similar to the psychological belief of 'locus of control' in that people who do not act pro-environmentally feel they do not have to take responsibility for it. The third barrier, practicality, stops people from acting pro-environmentally regardless of how much they value it, because of constraints such as lack of time, money, information and comfort. Without a necessary infrastructure to support pro-environmental behavior, people will be less likely to engage in those behaviors.

Kollmuss and Agyeman (2002) in their model of pro-environmental behavior distinguish the barriers between external factors such as structural, economic, social and cultural, and internal ones such as motivation, knowledge, value, responsibilities, and priorities.   While valuing the environment plays a role in determining an individual's behavior, other motivations and structural factors often play a greater role (Kollmuss & Agyeman, 2002; Leiserowitz, Kates, Parris, 2006).

Ackley (2009) conducted a qualitative study in which she interviewed five principals whose schools had been recognized for being green schools in the State of Maryland. The study concluded that these principals promoted ownership and stewardship of environmental action and were able to clearly articulate their own personal commitment to the environment and why it was a high value for them. This study found that green school principals were intrinsically motivated to take on environmental causes because they were knowledgeable about the issues. This study also found that certain external factors made it challenging to be a green school leader such as the construction and building process, funding for green building projects and finding teachers qualified to incorporate environmental education into the curriculum. Ackley's study supports the need for system level leaders to be knowledgeable of environmental issues as having this knowledge created a strong intrinsic motivation for these principals to lead their schools in actions that supported environmental leadership practices.

In another study (Schelly, Cross, Franzen, Hall and Reeve, 2010), the energy conservation efforts and their impact on usage and consumption at two public high schools in Colorado were compared over a period of eight years. The researchers used quantitative energy data from the district and qualitative data from focus groups and interviews to understand behavioral change in an organizational setting. The case study aimed to explain how one of the high schools, Rocky Mountain, a decades old traditionally inefficient building, was able to reduce its electricity consumption to levels far below, by at least 50%, the other high school, a Leadership in Energy and Environmental Design (LEED) certified school. The researchers concluded from this study that leadership made the difference. The principal of Rocky Mountain

communicated his vision and commitment to environmental values and behavioral expectations to all building occupants. The principal integrated these pro-environmental behaviors into the existing code of conduct and regularly communicated progress and success with staff, students and the larger community. The Advanced Placement Environmental Science teacher assisted the effort by getting his students involved in the building's recycling program and by regularly posting building signs and email reminders to encourage conservation behaviors. At the other district high school, the principal delegated the responsibility of energy conservation to a temporary administrator and that school's Advanced Placement Environmental Science teacher was not active in the process because she felt that the administration should lead the efforts in the building. The researchers also concluded that LEED certified buildings foster the potential for mindlessness where the building occupants rely on the building to perform, or act environmentally for them. The results of this study support organizational change as a viable solution for the conservation of energy and that pro-environmental behaviors can be integrated into a consistent conservation culture resulting in energy savings. It also underscores the importance of leadership to foster a collective capacity to achieve desired outcomes.

Leadership Strategies That Support Environmental Sustainability

A new type of leader is needed, one who will be able to approach the future with "an open mind, heart and will" (Scharmer, 2007, p. 40). While there is not a great deal of research on the intersection of leadership and environmental sustainability (B. Brown, 2011; Cox, 2005; van Velsor, 2009), there are theories that hold promise for transitioning to environmental sustainability: adaptive leadership, systems thinking and leading

change. These theories serve as the foundation for the leadership strategies – the "how"

of leadership – needed to address the emerging challenges related to environmental

sustainability. Strategies are an essential component of leadership and as the ancient

Chinese philosopher Sun Tzu (n.d.) said, "All men see these tactics whereby I conquer,

but what none can see is the strategy out of which victory evolved."

Adaptive leadership. Heifetz acknowledged the challenge facing humanity and

the need for adaptive leadership as a necessary solution.

> Our focus on the production of wealth rather than the coexistence with nature has
> led us to neglect fragile factors in our ecosystem. …We may have paid a high
> price in damage already done, and the costs of and odds against adaptive
> adjustment may have increased enormously. (Heifetz, 1994, p.30)

Heifetz's theory of adaptive leadership (1994) calls for leadership as a way to

mobilize stakeholders to adapt to new challenges, new challenges that call for solutions

that lie outside of conducting business as usual. Adaptive challenges leading to adaptive

solutions require new learning, innovation, and new patterns of behavior that shape new

possibilities for tomorrow's world (Heifetz & Linsky, 2007). Adaptive work is based on

three challenging tasks: figuring out what is essential and what to keep from past

practices, figuring out what to purge from past practices so as not to be bogged down

when moving forward, and innovating new ways that stem from the best of the past that

will meet the challenges of the future (Heifetz, Grashow, & Linsky, 2009a). Leadership

is about challenging people to live up to their words and closing the gap between their

espoused values and their actual behavior (Heifetz & Linsky, 2004). Adaptive work

requires the leader to facilitate a change in values, beliefs and behavior in others (Heifetz,

1994).   It is the responsibility of the leader to get people to clarify what values are the most important and what trade-offs are necessary to meet the new challenges (Heifetz, 1994). Closing the value action gap and encouraging pro-environmental behavior will become one of the greatest leadership challenges of our time. Heifetz, Grashow, & Linsky (2009b), warn that even when the economy recovers, there will be a new normal which will require leaders to lead through uncertainty, disequilibrium, and new challenges. Shifting the responsibility of ES to all stakeholders so all adapt to and adopt a new way of operating on both an individual level as well as an organizational one will be the challenge of leading for environmental sustainability.

Bennis (2008) also supports adaptive capacity, or resilience, as the single most important quality of a leader because it allows the leader to respond quickly and intelligently to relentless change. Bennis (2008) suggests that adaptive capacity includes the ability to identify and seize opportunities through innovative learning and to also make decisions before all the data are in since speed is often required. Bennis (2007) asserts that if we wait for all of the data to be in, it just may be too late to stem the threat of biological catastrophe. Bennis contends that leadership is always a matter of values and that too few leaders have an awareness of the common good (Bennis, 2007). An adaptive leader must not only have an awareness of the common good, but the courage to translate this into decisions that promote the collective sense of what is best for all.

Otto Scharmer's *Theory U* (2007) reasons that downloading the past and continuing to approach new challenges with the same way of addressing past problems will not be enough in meeting the new challenges that face humanity. Scharmer and Kaufer (2013) contend that today's leaders are operating from a blind spot, and

34

perpetuating an economic framework that focuses on an ego-system "driven by the concerns and intentions of one's small ego self" (p.2). Scharmer and Kaufer (2013) promote a transformation to an eco-system where concerns and intentions are driven by what is best for the eco – or whole house, a prefix that originates from the Greek word *oikos* meaning house (Encyclo Online Encyclopedia, 2013). The crisis facing the environment is an ecological divide, the fault line between humans and nature, which promotes commodity fiction or the underlying belief in economic theory that nature can be bought, sold and consumed (Scharmer & Kaufer, 2013). This age of disruption will require leaders to eliminate the blind spot of producing results that nobody wants, results that only benefit the few by bringing detriment to all (Scharmer & Kaufer, 2013). The adaptive work needed will require leaders to transition organizations and stakeholders from an ego- to eco-system focus to match the reality of these new challenges. Scharmer and Kaufer (2013) posit that there are three leadership myths that perpetuate the ego-system. The first erroneous belief is that the leader is the guy at the top and it is his job to solve all the problems. Today's leadership challenges call on everyone in the organization to be involved. Transitioning to environmental sustainability will require each and every person to "co-sense, co-inspire and co-create new possibilities together" (Scharmer and Kaufer, 2013, p. 114). It will never happen if people rely on the leader to do it alone. Another misconception is that leadership is about individuals. Rather, leadership is about the capacity of the whole system working together to sense and explore new ideas together. The last myth, according to Scharmer and Kauffer (2013), is that leadership is about creating and communicating a vision. Scharmer and Kauffer (2013) believe that it is not about sending a message, but about listening. "Listening is

the most important gateway to co-sensing and co-creating the emerging future"

(Scharmer and Kaufer, 2013, p. 113). They report that the reason many companies and

new initiatives fail is not due to an absence of vision, but because the vision was out of

touch. The leader failed at listening.

> All great leadership starts with listening. That means listening with a wide-open
>
> mind, heart and will. It means listening to what is being said as well as to what
>
> isn't being said. It means listening to the latent needs and aspirations of all
>
> people. (Scharmer & Kaufer, 2013, p. 113)

Brown (2011) conducted a qualitative study on how exemplary leaders who hold

a complex meaning-making formulate sustainability initiatives. By using a

psychological instrument to assess the action logic of 32 leaders and change agents from

various sectors engaged in sustainability work, the researcher identified 13 who measured

at the latest stages assessed by the action-logic instrument. Brown then interviewed these

leaders regarding their experience and process of designing sustainability initiatives.

This study had three major findings. First, leaders for sustainability operate and design

from a deep inner foundation. These leaders had a deep intrinsic motivation to be of

service to others and the world. These participants also embraced uncertainty, or

disequilibrium, and demonstrated commitment and patience to engage in the next step of

the design. Second, leaders for sustainability accessed powerful internal resources and

theories to distill and evolve the design. These participants used intuition and other ways

of knowing that were different from a rational, logical approach. All participants

navigated using systems theory, complexity theory and/or integral theory. The

participants used these theoretical perspectives to guide development and the creation of

the systems of the sustainability initiative.   Lastly, leaders for sustainability manage the design by dialoguing with the system to consistently adapt it. These leaders consistently probed the system through objective research, talking with stakeholders and adopting their perspectives, and reflecting deep inside of themselves for new information. These leaders also created supportive conditions for improving the capacities of the designers and viewed themselves in a catalyst role when necessary.   The essential qualities of these leaders were Being (who they are), Reflecting (how they think) and Engaging (what actions they take).   These findings suggest that exemplary leaders for sustainability focus on systems, support the collective to develop, and adaptively manage an initiative, which are all elements that support the theories of adaptive leadership, systems thinking and leading change.

Systems Thinking. Senge (2000) also calls for leadership that facilitates new learning and builds adaptive capacity through five disciplines: personal mastery, shared vision, mental models, team learning and systems thinking so that an organization can become a learning organization. "Personal mastery" calls for an assessment of the current reality and by articulating a new vision, people can expand the capacity to make better choices to achieve desired results (Senge, 2000).   Through a "shared vision," people come together and focus on a common purpose (Senge, 2000). "Mental models" allow people to reflect on their own attitudes and perceptions and the role they play in contributing to the current reality (Senge, 2000). "Team learning" takes the old conversations and collectively allows them to unfold in new ways (Senge, 2000). The fifth discipline, "systems thinking," integrates the other four so that people realize the interdependency of complex systems and the forces that influence and constrain their

behaviors (Senge, 2000). When large numbers of individuals begin to reflect on their attitudes and perceptions, Senge (2006) affirms that this new learning will lead to behavior changes and ultimately to desired outcomes.

Adapting people's behaviors and mental models will be no easy task. The seeds of society's dependence on fossil fuels and its misuse of natural resources were planted with the Industrial Revolution, which has resulted in the decimation of nature at an alarming rate. The Industrial Age culture of "make-take-waste" is based on numerous beliefs that have become deeply entrenched in the way people live and the way people think (Hawken, 2007; Hawken, Lovins & Lovins, 2010; Senge et al., 2008). Some of these mental models include the beliefs that energy is cheap and never-ending, there will always be enough room to dispose of garbage, humans cannot affect climate or the environment, and that natural resources are unlimited (Senge et al., 2008). Doppelt (2010, p. 14) adds that the scientific and environmental challenges facing humanity are a result of "maladaptive beliefs, assumptions and thought patterns that have produced deeply entrenched and dysfunctional behavioral patterns as well as social and economic systems." The loss of the environment has been seen as a necessary tradeoff for economic growth. Business justifies these rights because of their irrefutable argument that business creates value. One might ask, how much value is created amidst all that is destroyed in the process of creating this value? The economics of not responding to these challenges will continue to become more costly as can be seen from the devastating effects of Hurricane Sandy, or Superstorm Sandy in 2012, as it became to be known.

Many of society's mental models are hidden from view. Landfills have been created to serve as modern society's great repositories, or graveyards, for all that was

once abundant and alive on this planet. McDounough and Braungart (2002) call this linear, one-way model - "cradle-to-grave," a hallmark of the industrial system. In this path, companies sell their products to consumers, which is actually a misnomer because most manufactured items are not actually consumed, but rather, designed to be thrown away (McDonough & Braungart, 2002). This is in sharp contrast to nature, or the "cradle-to-cradle" model of "borrow-use-return" where everything is recycled and nothing is wasted or thrown away because in nature, there is no away (Hawken, 2007; McDonough & Braungart, 2002).

The Industrial Age has often been called the "machine age" because of the manner in which machines have dominated and transformed the way people think, behave and work (Senge et al., 2008; Senge & Carstedt, 2001; Scharmer, Jaworski, & Flowers, 2004). The assembly line mentality has created a mindset that promotes compartmentalized thinking, the opposite of systems thinking (Senge et al., 2008). Assembly line-thinking perpetuates the ego-system by ignoring the related and interdependent relationships that exist in the world (Scharmer & Kauffer, 2013).

Systems theory has its origins in the natural sciences and through the work of Von Bertanlanffy (1968), acknowledges life's interconnectedness through the concept of ecosystems. Bertanlanffy (1968) challenged scientists to look at the balance between the interactions of soil, water, air, plants, animals and humans to optimize survival and health. These ideas have been applied to a number of fields and are known as "systems theory" (Capra, 1996). Systems theory (Satterwhite, 2010) calls for the circle, or the system as a whole, to be widened to include the planet and all of its living systems. Satterwhite's (2010) theory of Deep Systems Leadership is depicted as a triangle within

39

the circle of cultural biology linking together theories of deep ecology, systemic leadership and systems theory. Each angle of the triangle brings together the sides - systems and the environment, the environment and people, and people and systems to address collective challenges by working toward a common goal (Satterwhite, 2010).

Senge (2001) advises that the innovators of today and tomorrow will create the future through a systems approach, by allowing nature to serve as the model. The central tenets of systems thinking as it applies to leadership include – "seeing systems, collaborating across boundaries, and creating versus problem-solving" (Senge et al., 2008; p. 11). Collaborating across boundaries will never occur unless individuals as well as organizations view their fates as inextricably linked, and are able to cultivate a shared vision. The shift from seeing a world of suppliers and customers to one in which we are all part of a larger system is essential (Senge, 2001).

Wheatley and Kellner-Rogers (1999) utilize examples from nature and systems theory to provide lessons on leadership and human organizations. They suggest that life expands and thrives by linking together through symbiosis. "Once individuals link together they become something different" (p. 67). Wheatley gives us hope to think that in a "world of emergence, new systems appear out of nowhere, and the forms they assume originate from dynamic processes set in motion by information, relationships and identity" (p. 87). Leaders in a 21st century world will need to develop systems modeled after the symbiosis that exists in nature.

Hawken, Lovins & Lovins (2010) call for an approach that focuses on radically increasing the productivity of natural resources so they are used more efficiently and effectively through "natural capitalism." Leaders will need to look to nature for guidance

40

for models to be replicated or biologically inspired (Hawken, Lovins & Lovins, 2010).

Through "bio mimicry," wasteful and toxic materials and substances can be reduced, or

eliminated, by constantly reusing materials in closed cycles, like nature (Doppelt, 2010;

Hawken, Lovins & Lovins, 2010).   This process of creating zero waste is one that

follows the "borrow-use-return" model, or the "cradle-to-cradle" belief of creating zero to

landfill waste (McDonough & Braungart, 2002). It is based on a regenerative process,

one that calls for a new type of leader who will be able to influence stakeholders to get

them to accept new mental models of consumerism and new ways of living and behaving.

Leading Change. The Wheel of Change Toward Sustainability is a change

model based on the extensive research by Bob Doppelt (2003, 2010). This model serves

as the primary lens for the change strategies that are applied to this study. This model,

based on adaptive leadership, systems thinking and change theories, was the most

appropriate to apply to public school districts since the outcomes are more focused on

creating systems and structures, and leading people to make new choices rather than

focusing on elements that do not exist in the realm of public school education i.e. share

holder value, product development, raw materials, supplier markets, and packaging.

Doppelt (2010) extensively interviewed exemplary leaders of large companies,

mid and small size firms, and mid and large sized city governments as well as leaders

from their communities about the change strategies used in transitioning toward

environmental sustainability. Using this information, he constructed a framework

consisting of seven solutions, or strategies, designed to guide leaders in developing the

necessary infrastructure to lead change toward environmental sustainability within their

organizations. Doppelt (2010) organized the seven solutions of the Wheel into major

change drivers that he states are leverage points for organizational transformation toward environmental sustainability. Each intervention or step builds the foundation for the next. Doppelt (2010) recommends completing each step before advancing to the next.

Doppelt (2010) reasons that new initiatives are often unsuccessful because of the failure to address underlying thought patterns, outlooks and behaviors of employees. He purports that resistance can be expected whenever the possibility of a change in the status quo is attempted. Senge (2006, p. 88) asserts that, "Resistance almost always arises from threats to traditional norms and ways of doing things. Often these norms are woven into the fabric of established power relationships." Doppelt (2010) suggests that to overcome resistance, leaders need to find key leverage points where a small change in one thing will shift the direction and result in large gains. Doppelt's (2010) research indicates that changes in governance provide the greatest overall leverage for making progress toward environmental sustainability. He compares governance systems to "three legged stools that shape the way information is gathered and shared, decisions are made and enforced, and resources and wealth are distributed" (Doppelt, 2010, p. 96). Theorists agree that failure to alter the way organizations govern themselves through the transformation of structures is the key reason why change reforms are not successful (Kotter & Cohen, 2002).

Change the dominant mind-set through establishing a compelling need. The greatest leverage point for achieving environmental sustainability is to change the dominant mind-set and the controlling mental models that exist so as not to perpetuate the status quo. For this reason, the first spoke of the Wheel instructs leaders to challenge the failures of the old system and repeatedly describe why the new one is better.

42

Environmental sustainability requires that the emphasis shift from managing resources to managing ourselves within those resources (Wackernagel and Rees, 1996). Translating environmental sustainability into meaningful action will require a dramatic shift in the mental paradigms and behaviors of employees. Failure to modify thinking and perspectives permits old decision-making and activity patterns to remain intact (Bridges (2009; Doppelt, 2010; Kotter & Cohen, 2002).   Leaders will need to inspire a shared vision, provide direction and reinforce the need to alter the beliefs and actions of their employees to achieve the new goals (Kouzes & Posner, 2007). The system leader can make the difference to ensure an outcome of change. Schein (2010, p. 243) states, "What leaders consistently pay attention to, reward, control, and react to emotionally communicates most clearly what their own priorities, goals and assumptions are."

The first step in changing the dominant mind-set is to convince people that the Industrial Age model of make-take-waste is no longer viable. Bridges (2009, p. 37) informs, "The first task of transition management is to convince people to leave home." Bridges (2009) advocates framing the problem such that the leader and the employees are on the same side, with the problem on the other. Bridges contends that people need to see the problem, acknowledge it and understand it. Reeves' (2009) supports associating the case for change with a moral imperative instead of compliance with authority. Doppelt (2010) states that many sustainability initiatives fail in this initial stage because leaders are unable to alter the prevailing belief systems that support the status quo. A compelling case of change needs to be woven into employees' mental models to motivate them to adopt the sustainability-based borrow-use-return philosophy. In transitioning to environmental sustainability, the case must be made that the threat of not adapting to the

borrow-use-return (cradle to cradle) paradigm could actually be more damaging than the threat of doing nothing (Bridges, 2008; Doppelt, 2010).   Leaders must also be cognizant that their symbolic actions will set the tone positively or negatively depending on the example being set (Bennis, 2008; Kouzes & Posner, 2007). Schein (2010, p. 237) contends, "The most powerful mechanisms that leaders have available for communicating what they believe in or care about is what they systematically pay attention to."

One strategy is to use data to develop a performance gap analysis by which an organization can compare its current environmental performance with desired goals and expectations as a way to identify immediate needs (Doppelt, 2010; Esty & Winston; 2009). This requires that organizations complete a sustainability audit of their internal operations. A key goal of the sustainability audit is to document how improved energy, water and materials efficiency, less waste and reduced toxicity can result in reduced costs while enhancing community support (Esty & Winston; 2009). Doppelt (2010) advises leaders to research what other similar organizations are doing to address issues related to environmental sustainability. No organization wants to be seen as a laggard by failing to respond in a timely and effective manner.   Lastly, Doppelt (2010) recommends that the audit include how rising energy costs and climate change will impact the organization.

Rearrange the parts of the system through the organization of teams. Doppelt (2010) recommends that leaders rearrange the parts as the second greatest leverage point for an organization in its transition toward environmental sustainability.   Doppelt found that transition teams must be empowered to plan and direct the change initiative. Kotter and Cohen (2002) recommend more creative solutions are needed when trying to

eliminate barriers; people need to be empowered into action. Transitioning to
environmental sustainability will require each and every person to "co-sense, co-inspire
and co-create new possibilities together" (Scharmer & Kaufer, 2013, p. 114). Kotter and
Cohen (2002, p.43) recommend the "team be made up of the right people with the
appropriate skills, the leadership capacity, the organizational credibility and the power to
make transformation happen."

Through his research, Doppelt (2010) has concluded that organizations leading
the way toward sustainability get the right people believing in the mission first, and then
ask these people to clarify the purpose and vision, and map out a path to achieve them.
Getting the right people in the right positions is an essential component of developing an
organization's leadership team. James Collins in his book *Good to Great* (2001)
identified several key factors, in addition to Level 5 leadership, that took companies from
good to great.   According to Collins:

> We expected that good to great leaders would begin by setting a new vision and
> strategy. We found instead, that they first got the right people on the bus, the
> wrong people off the bus, and the right people in the right seats – and then they
> figured out where to drive it. (2001, p. 13)

However, when Jim Collins (2001) was busy figuring out which seats to get
everyone into on the bus, it appeared that he had not considered the harmful CO_2
emissions from the diesel fuel required to run the bus. Successful leaders for a 21st
century world will need to look through an environmental lens when planning district
operations and strategies. Not only will 21st century leaders have to get the right people

on the bus, they will have to design a bus that will produce zero CO_2 emissions and not contribute to the depletion of the world's natural resources.

Doppelt charges the transition teams to dig deep into company practices so that structures and processes may be redesigned around the cradle-to-cradle model. Getting the right people involved in the transition teams is extremely important. These people should have key technical skills, hold pivotal positions of authority, have widespread credibility, and represent people from the key areas needed to accomplish the team's mission (Fullan, 2008).

Alter the goals of the system by adopting visions and principles. The third most significant leverage point for transitioning to environmental sustainability is for an organization to alter its goals (Doppelt, 2010). Doppelt (2010) recommends establishing environmentally sustainable goals that inspire followers, look to the future and expand possibilities. Bridges (2008) advises leaders to paint a picture of how the outcome will look and feel. The vision should be created through ends planning, or back-casting, starting from a specified date in the future and include sustainability principles that provide a common language that will help to create new conversations (Doppelt, 2010).

Chip and Dan Heath (2010) provide another perspective on getting change started. They claim that what may appear to be resistance is often a lack of clarity. If the Rider is not sure where to go, he will lead the Elephant in circles. According to their model, the Rider provides the planning and direction, while the Elephant provides the energy and drive, both necessary components of the transformation. Clarity of purpose requires the formation of a set of beliefs with their corresponding mental images that

allow participants to have clear distinctions between out dated goals and the new vision (Heath & Heath, 2010).

Restructure the rules of engagement by creating new strategies. This is the fourth greatest leverage point in transitioning toward environmental sustainability. Doppelt (2010) cautions that changes must occur on multiple levels to make the transformation to environmental sustainability – in people, culture, leadership styles, problem-solving approaches, systems, technologies, and practices. When developing one's implementation plan, it is best to start with assessing one's environmental footprint (Esty & Winston, 2009). Every organization leaves a mark on the world through the products it makes and services it offers, but if it takes more than it's fair share of the Earth's resources to fulfill it's mission, steps should be taken to reduce consumption and waste (Esty & Winston, 2009). Esty and Winston (2009) promote Eco—Tracking tools, which include tracing one's environmental footprint, capturing data and establishing benchmarks, setting up environmental management systems and partnering for advantage. Partnering is a key tool for generating Eco-Advantage and the authors recommend partnering with experts, government, universities, communities, and other organizations to be more environmentally efficient (Esty & Winston, 2009).

Once a baseline is established regarding one's environmental footprint, the organization must set performance goals and measurable targets to close the gap. Esty and Winston (2009) suggest creating a detailed environmental management system tracking key environmental metrics to help the organization run more efficiently and to find ways to squeeze out waste through tracking energy and water use, greenhouse gas emissions and waste.

Shift the information flows of the system by tirelessly communicating the need,
vision and strategies. The fifth greatest leverage point in transitioning an organization toward environmental sustainability is to shift the information flows. Reeves (2002) contends that people perceive change not in an organizational context but in an individual one where they are mostly concerned about what it means for them. Inadequate information is one of the dominant reasons why sustainability or change initiatives fail (Doppelt, 2010, Fullan, 2008). There needs to be constant reinforcement about the need, purpose, strategies and benefits to environmental sustainability to ensure employee buy-in. Only those messages that are continuously heard and valuable to daily life penetrate through all of the information clutter that people receive on a daily basis (Doppelt, 2010, Reeves, 2002). Transparent communication promotes a culture of honesty and sharing while inconsistent words or actions can mislead employees and derail the effort (Bennis, Goleman & O'Toole, 2008). Employees also need to be given opportunities to discuss new initiatives so that the correct conversation and dialogue are constructed to avoid misunderstandings and the spread of negative sentiments. According to Heath and Heath (2010), the problem-seeking Rider has a predilection for the negative. "Instead of asking, what's broken and how do we fix it? The question should be, what's working and can we do more of it?" (Heath & Heath, 2010, p. 45). Senge (2000) compares sustainable change in organizations to nature where "growth starts small, accelerates, and then gradually slows until full adult size is reached" (p. 273). Chip and Dan Heath (2010) call these incremental steps shrinking the change through building people's confidence.

Doppelt (2010) advises organizations to establish communication plans that address how information will be gathered and distributed, how decisions will be made

and how scrutiny and feedback from employees and stakeholders will be handled. Since sustainability may be a difficult concept to grasp, information should be easy to understand (Mckenzie-Mohr, 2011). The message of environmental sustainability should be reinforced with every opportunity that leaders can take advantage of – meetings, speeches, emails and organizational publications.

Correct the feedback loops of the system by encouraging and rewarding learning and innovation. This represents the sixth greatest leverage point for transitioning toward environmental sustainability. There are numerous barriers that can be overcome through continual learning. Change occurs in a deeply rooted process, one that entails learning and unlearning (Doppelt, 2010; Schein, 2010; Senge, 2000). Senge (2000) believes that change takes place in the deep learning cycle when "new skills and capabilities, new awareness and sensibilities, and new attitudes and beliefs reinforce each other" and is only sustainable if it involves learning (p. 26). The key factor in an organization's transformation to environmental sustainability is learning (Doppelt, 2010; Dunphy, Griffiths & Benn, 2007; Senge et. al, 2008). Schein (2010, p. 308) cautions leaders, "Behavior change alone will not last unless accompanied by cognitive redefinition" which he defines as "reframing or shifting behavior to learn the new concepts, new attitudes and the new acceptable behavior." Schein (2010) reasons this can only occur through psychological safety. The first stage, which Schein (2010) terms "unfreezing", calls for members to unlearn something before they can learn something new. He views the key to understanding the resistance to change as knowing how this behavior that needs to be unlearned serves a positive function. Schein (2010) recommends the need to reduce survival anxiety, disconfirmation, and learning anxiety.

The goal is for the learners to feel psychologically safe so they will be able to see the new way as being possible and achievable rather than too anxiety provoking. Schein (2010) states that the interaction between survival and learning anxieties creates the complex dynamics of change. The second stage involves the system leader being clear about ultimate goals and the new way of working. The final step, according to Schein (2010, p. 311), is refreezing, which means, "The new learning will not stabilize until it is reinforced by actual results."

Doppelt (2010) stipulates that learning within organizations occurs on three different levels – individual, team and organization. All learning begins at the individual level where the organization must provide the necessary tools and atmosphere to encourage individual learning (Doppelt, 2010). Such opportunities include: self-managed learning, learning from co-workers, computer-assisted learning, daily work experiences, special assignments on projects, on-the-job coaching and classroom training linked to specific activities. Team learning occurs through a combination of practice and reflection and creates a positive feedback loop that helps to improve the entire organization (Doppelt, 2010; Senge, 2000). According to Kotter and Cohen (2002), the power of culture can help to make change stick and it will happen naturally as long as there is continuity of desired behavior and a definite pattern of success over time.

As with individual learning, team learning occurs more often and rapidly when teams are rewarded for their contributions to the organization's pursuit of sustainability (Doppelt, 2010). Kotter and Cohen (2002) advocate for celebrating accomplishments to diminish the power of naysayers and, thereby increasing the validity and value in the change initiative. Heath and Heath (2010) recommend that leaders find the bright spots

– sparks of hope that amplify the change, confirming it is possible. Reeves (2009) supports the use of short-term wins to close the implementation gap through an incremental approach to change that includes recognizing and celebrating what works, and emphasizing effectiveness instead of popularity. Financial rewards as well as recognition of individuals, teams and the organization are most effective when they are aligned with the organization's vision and strategy and serve as powerful catalysts for innovation (Doppelt, 2010).

   Adjust the parameters of the system by aligning systems and structures with sustainability. This is the last leverage point in the transition toward environmental sustainability. The new initiatives must be embedded within the organization through a systems approach. This occurs through a process of aligning the critical parameters of environmental sustainability throughout the organization including all internal systems, structures, policies and procedures (Doppelt, 2010). When standard operating procedures are linked with all the other leverage points on the Wheel, the change is iterative. Doppelt (2010) advocates for this step to be the last one in the process after the right type of thinking and behavior have been cultivated. He cautions that learning and innovation must flourish first before policies and practices can be altered. Alignment helps everyone move in the same direction as a system, rather than as a collection of separate components. Alignment means that all of the most important aspects that impact organizational performance – leadership, vision, goals, structures, strategies, tactics, communications, learning, rewards, compensation, hiring, promotion, accounting, decision-making, information, and employee involvement mechanisms – have the same underlying goals, the same standards and send the same message (Doppelt, 2010).

Leadership Actions That Support Environmental Sustainability

Action, or the "what" of leadership, refers to the results of the leadership strategy. These outcomes together move an organization forward and allow it to fulfill its goals. Leadership actions that support being an environmentally sustainable K-12 organization include transitions in the areas of making district buildings more energy efficient, encouraging conservation behaviors of building occupants and reducing waste throughout the district. Advisement for system leadership is included so that actions may focus on those that can make the biggest difference for both the environment and the school district.

Energy efficiency of buildings. Carbon emissions can be cut just by improving world energy efficiency (L. Brown, 2011). The electrical power grid is a complex system of supply and demand, where wires and machines transport the sources of electricity from power plants to the substations, and on to the end user. While there exists significant need for greater efficiencies and structural upgrades to the supply side of energy, especially since the infrastructure on which it was built was created over 100 years ago, the system leader mostly has control over the demand side. This encompasses reducing consumption and waste of energy with the end-user, or the building and its occupants.

There is reason to act since the United Nations Department of Economic and Social Affairs (UNDESA) (van Dam, 2010) reported that the use of fossil fuels in buildings alone are responsible for about 30% of carbon dioxide emissions. One of the most cost-effective ways to reduce carbon emissions is through increasing efficiency through energy retrofits and to require a high degree of efficiency in new buildings. According to the New York Power Authority (Optimal Energy, 2013), capturing all of

the economic energy efficiency potential at both public and private schools throughout New York State could reduce annual CO_2 emissions by as much as 1.4 million metric tons, or the equivalent of taking roughly 300,000 cars off the road each year.

Numerous old and inefficient buildings form the backbone of the United States education system as school buildings have long life cycles and are costly to replace. Last estimates put the average age of school buildings at 40 years old (U.S. Department of Education, 1999).   If these buildings are to consume less energy and produce fewer carbon emissions, they need to be retrofitted. This is the best short-term solution to reducing Green House Gas (GHG) emissions since eliminating these existing buildings in favor of new higher efficiency buildings is not feasible and could not happen fast enough to drastically reduce GHG emissions in the short term (Judkoff, 2012). However, several experts agree that over the long run, designing energy efficiency into new school buildings is more economical than energy efficiency retrofits (Judkoff, 2012). Additionally, there can be safety and health issues associated with the energy retrofit of existing buildings such as air quality, combustion gases, asbestos, lead paint, mold, moisture problems, and electrical hazards (Judkoff, 2012).

According to Energy Smart Schools (US Department of Energy, n.d.), a school renovation that incorporates high-performance design can net up to a 30 percent annual savings on utility costs. Opportunities exist for reducing electricity use in buildings and getting the most productivity from every unit of energy through the use of innovative materials, technologies and equipment, insulation, LED lighting, and efficiency through computerized software (US Department of Energy, 2008; EPA, 2011). Measures that can be taken to reduce energy use in existing school buildings include upgrades to the thermal

envelope, replacement of heating and cooling equipment, reconfiguration of HVAC systems, implementation of better control systems, lighting improvements and implementation of measures to reduce the use of hot water (US Department of Energy, 2008; EPA, 2011; Harvey, 2009). Out of all of these upgrades, Harvey (2009) recommends that a high-performance building envelope (windows, insulation, foundation, walls and roofing) is the single most important factor in the design and renovations of low energy buildings because it reduces the heating and cooling loads that the mechanical system must satisfy but also because it allows for alternative systems to meet the reduced load. Harvey (2009) advises that the second most important building upgrades include better and alternative energy-using systems such as heating, ventilation, cooling and lighting systems. Lastly, upgrades to more efficient devices such as boilers, fans and lamps should be added.

The New York Power Authority (Optimal Energy, 2013) recommends a different prioritized list for building upgrades based on their meta-analysis study of energy cost savings and associated project costs. Through their study, they concluded that improvements that result in the greatest savings for school districts are replacements of boilers or boiler burners in heating systems, lighting and lighting controls and direct digital controls. Regardless of which upgrades are implemented first, a systems approach should be applied to all of the energy devices to maximize the savings at the system level, which can be much higher than savings for the individual devices (Harvey, 2009; Optimal Energy, 2013).

Freeman and Tryfonas (2011) go one step further by recommending a systems thinking approach to reducing end use energy demand and that a more integrated

approach is needed, one which connects all of the parts instead of addressing issues in

isolation. Through action research and case studies, Freeman and Tryfonas (2011) tested

their hypothesis that three intervention strategies, based on a combination of both hard

and soft subsystems, were effective and flexible enough to be applied to a variety of

organizations with positive results. Their interventions were based on energy efficiencies

categorized as hard and soft subsystems and when integrated, maximized reductions in

energy usage and waste. Hard subsystems involve optimizations, or upgrades that can be

applied to the physical building as well as facilitating synergies between energy saving

technologies. Soft subsystems relate to the behavior and habits of the occupants while

they are within the building. When combined, both hard and soft subsystems allow for

feedback loops, or key information to be gathered on the interactions between technology

and people, how occupants use or misuse the equipment, and when to use automated

controls versus manual controls. Their study applied three main interventions to a variety

of buildings in England including one school. It should be noted that this school building

had significant technological upgrades, which allowed for the sharing of real-time energy

consumption data. The first intervention, "energy information feedback" provided a

feedback system to monitor and report energy usage and wastage in real time. Data were

then shared with occupants so they could better understand their impact on the building.

The second intervention, "behavior change," ensured that building occupants received

end-user training on both equipment and building use, and received frequent reminders to

encourage behavioral habits that reduced the consumption and waste of energy. The third

intervention was to use "technology controls" to reduce energy waste due to misuse of

end-use equipment. Technologies such as automated controls can replace the need for

manual controls, and building management systems can optimize the building subsystems to work in sync with the school's scheduling needs. This finding emphasizes the importance of training the appropriate personnel on how best to operate the equipment to maximize energy efficiencies. Applying an integrated approach to reducing the consumption of energy in each school building will be the responsibility of the system leader to optimize building upgrades and ensure that building occupants learn how to effectively interact with the building and its technologies to maximize the efficiency potential. The key difference in a systems thinking approach is that building occupants become a part of the solution to reducing energy consumption and waste.

There is great potential for large energy savings in the field of lighting, more so than in any other area (U.S. EPA, 2011; Zhu & Humphreys, 2012). While savings is one reason why districts should pursue upgrades in lighting, as lighting represents about 26% of the electricity consumed in a typical school, another very important reason is that fossil fuel combustion for electricity generation accounts for 40 percent of the nation's carbon dioxide (CO_2) emissions, a principle GHG, and major contributor to climate change (U.S. EPA, 2011). NYPA (Optimal Energy, 2013) reports that many of the audited schools in New York State still have lighting fixtures that use the least efficient type of fluorescent bulb and by upgrading a building's lighting, districts can save roughly 15% on total building energy consumption. While the goal is to take advantage of natural lighting as much as possible, modern light sources such as incandescent light bulbs and compact fluorescent lamps use a significant amount of energy and are also extremely inefficient (Zhu & Humphreys, 2012). Incandescent light bulbs only convert about 5% of the electricity they use into visible light while compact fluorescent lamps (CFLs) are only

20% efficient with the rest lost as waste heat (Zhu & Humphreys, 2012). Another drawback to CFLs is that they present a huge environmental risk. If they are not recycled or properly disposed of the mercury will spill out and cause great contamination (Engelhaupt, 2008).

The first step in upgrading district lighting should focus on the lighting system to include the use of occupancy sensors to turn off electric lights when not needed, or, light sensors that take advantage of natural light and only allow lights to go on when it becomes too dark. The next step is to use more efficient lighting through light-emitting diodes (LEDs). The use of LED lighting is projected to reduce electricity consumption for lighting by 50% so that lighting would represent less than one-tenth of total energy consumption and provide reductions of at least 10% in fuel consumption and CO_2 emissions from power stations within the next 5-10 years (Zhu & Humphreys, 2012). Since lighting is one of the largest causes of greenhouse-gas emissions, it is encouraging to know that a simple fix such as changing to high efficiency lighting can make a difference. The cost of LEDs is probably the major factor limiting their widespread use in schools. Since there are numerous school buildings, even relatively small energy reductions on an individual building can have a large impact.

Direct digital controls have been developed to maximize efficiency of heating and cooling and are strongly recommended to replace the older pneumatic thermostats (Optimal Energy, 2013). Districts can significantly lower their energy consumption by using digital controls that allow for recalibrating their schools' lighting, cooling, heating and other systems to work only when needed (US Department of Energy, n.d.). New software as well as online programs can help track energy consumption and

benchmarking of buildings so that energy decisions and targets can be made based on the data. One example, and the industry standard, is the Environmental Protection Agency's (2011) Energy Star Portfolio Manager program, which assists in making energy decisions based on data. Portfolio Manager helps to track and assess energy and water consumption within individual buildings as well as across an entire portfolio of buildings. Tracking consumption and cost data in the Portfolio Manager allows for benchmarking of building energy performance, assessing energy management goals over time, and identifying strategic opportunities for savings and recognition opportunities (US Department of Energy, n.d.).

Through the transition to renewable energy sources. It is no secret that the United States needs to reinvent its energy system to improve efficiency, and reduce pollution, contamination and Green House Gas (GHG) emissions. System leaders can assist in helping to facilitate a new paradigm in their communities by influencing the need for alternate solutions especially in renewable energy technologies. British Petroleum (2012) estimated that at the present rate of consumption, the world's current conventional oil reserves would last for a little more than four decades. Petroleum currently represents 36% of the total energy consumed in the United States with the transportation sector as its largest user (Outlook, 2011). Other sources of non-renewable energy systems include coal, natural gas, and nuclear energy.

Renewable energy sources only account for 9% of total energy consumed in the United States (Outlook, 2011). However, the road to a more sustainable future will require economic trade-offs and societal decisions that are bound to create controversy and ultimately, new winners and losers. Considerations include deciding which energy

systems to invest in, financing the cost of a sustainable energy system, how fast it should occur, and the ability to build new infrastructure to support it. Governments need to intervene on behalf of renewable energy to ensure subsidies are available so they can be cost-competitive with existing energy sources to allow a transition to occur.

Although renewable energy systems do not produce CO_2, it is important to understand that all energy systems have environmental impacts. Understanding the environmental impacts of these renewable energy systems is essential for making appropriate decisions for the future. Sources of renewable energy include wind turbines, biofuels, geothermal, and solar photovoltaic. New York State currently generates 22% of its energy from renewable sources far from its goal of achieving 30% by 2015 (Cuomo, 2010). The total breakdown of New York State's energy portfolio is nuclear 30%, gas and oil 23%, hydro 18%, coal 13%, natural gas 12%, and other renewable sources 4% (Cuomo, 2010).

Through conservation efforts. The availability of low cost and abundant energy has fostered an unquenchable thirst for energy and a tendency for people to regard the earth and its natural resources as completely at the disposal for whatever needs, wants and desires may exist. Examples of unnecessary waste of energy includes utilizing energy while electronic equipment is in standby mode, leaving lights on unnecessarily, heating and cooling buildings that are not occupied, using energy during peak demand periods when less efficient methods are used to produce power, and driving during periods of high traffic congestion (Orr & Benson, 2012). Behavioral changes are essential in order to develop new habits and attitudes toward consumption, the ultimate difference between engaging in conservation or not. In one case study (Schelly, Cross,

Franzen, Hall & Reeve, 2010), the researchers were able to determine that a decades old and traditionally inefficient high school was able to reduce its electricity consumption by at least 50% mostly in part to individual behavior change by the building occupants.

According to the Alliance to Save Energy (Cusick, 2012), a coalition of industrial, technological, and energy corporations that work with schools to improve their efficiency, many buildings can reduce their electrical consumption by 5 to15 percent without spending any money on new lighting, heating or air conditioning. The key factor, the Alliance says, is changing behavior as well as how building occupants view and use energy. Involving students in the process exposes them to authentic learning experiences, which can build life-long pro-environmental behaviors. The Alliance recommends that schools also utilize energy saving software that can reduce energy costs by as much as 30 percent. However, it is not just about reducing electrical consumption in schools but also about behaviors of building occupants that can reduce waste and conserve water.

Through the educational program. One way to encourage conservation efforts or pro-environmental behaviors is through education. Integrating environmental sustainability concepts into K-12 education as well as its practical application through student clubs and extracurricular activities can help to promote environmentally responsible behavior (Dimopoulos, Paraskevopoulos & Pantis, 2008). As the urgency to transition to environmental sustainability increases, education continues to be seen as a key factor in promoting a viable solution (Sterling, 2001, UNESCO, 1997). The UNESCO report (1997) asserts that education should play an integral role in helping to bring about the transformation required to become more environmentally sustainable;

schools have the ability to impact the way students interact with society and the environment now and in the future, and are in a key position to promote sustainable behavior change. Stevenson (2007) warns that the gap between rhetoric and practice in environmental education has widened over the past 20 years in large part due to a national focus on accountability measures governed by current national educational policy. Stevenson (2007) advocates for building collective capacity instead of relying on individual pockets of teachers to provide environmental education, as teachers cannot meet this challenge alone. Stevenson contends that the solution lies on two levels. The first level of building collective expertise and commitment to creating sustainable communities is to establish networks of support that include politicians, policymakers, and the public. The second solution allows schools to recapture their moral purpose of serving the public or common good (Stevenson, 2007).

Frisk & Larson (2011) contend that to further educational efforts toward environmental sustainability, distinct bodies of disciplines must be integrated into the K-12 curriculum – behavioral research, sustainability competencies, and education pedagogy. Changing individual behaviors and motivating collective action are essential components of sustainability education (Frisk & Larson, 2011). Frisk and Larson (2011) suggest that four knowledge domains need to be present in pro-environmental education: Declarative – Understanding of how environmental systems function; Procedural – Awareness of how to undertake particular actions; Effectiveness – Views of the outcomes of different behaviors; and Social – Awareness of motives and intentions of other people or society. These knowledge domains should also be cross referenced with four key sustainability competencies; systems thinking and understanding of interconnectedness,

long-term foresighted reasoning and strategizing, stakeholder engagement and group collaboration, and action-orientation and change-agent skills (Frisk & Larson, 2011).

Through the reduction of waste. Every year, the United States generates enough municipal solid waste (MSW) to fill a bumper-to-bumper convoy of garbage trucks long enough to encircle the globe almost eight times (Miller & Spoolman, 2009). The United States leads the world in trash production by weight per person; Americans produce twice the amount of solid waste than in any other industrialized nation and three-quarters of this solid waste ends up in landfills (Miller & Spoolman, 2009). Most of the waste includes, food, tires, disposable diapers, old carpet, enough office paper to build an 11 foot wall from New York to California, and some 186 billion pieces of junk mail each year with roughly 45% unopened (Miller & Spoolman, 2009). System leaders must help to stymie this trend by examining the waste produced by their school districts.

Electronic waste is a growing problem as well. Each year Americans throw away an estimated 155 million cell phones, 48 million computers and many more television sets and other electronic devices, all destined for landfills (Miller & Spoolman, 2009). This e-waste is accompanied by a multitude of toxic chemicals, which if not disposed of properly, or their parts recycled, can contaminate the ground and end up in the water supply.

Food waste comprises a portion of the municipal solid waste with estimates to be roughly 14% of the waste (US EPA, 2007). The researchers (Griffin, Sobal, & Lyson, 2008) conducted a systems approach study in New York State to quantify and compare food waste in one community food system and found that consumers were responsible for generating more than 8.8 billion kilocalories of food wasted, enough to feed county

residents for 1.5 months.   Another study (Marlette, Templeton & Panemangalore, 2005) focused specifically on plate waste by studying food lunch selections of 6th graders in three middle schools and found that milk, whole fruits and vegetables were wasted more than any other food items. The researchers found that the availability and purchase of competitive foods had the greatest impact on the plate waste of fruits and mixed dishes. This study suggests that the availability of competitive foods – available in cafeterias, vending machines, and school stores – presents a major challenge to school lunch planners and may influence the selection and/or consumption of menu items offered to students participating in the school lunch program, therefore leading to increased school lunch plate waste. One must wonder about the amount of food waste generated after the School Lunch Program implemented new guidelines under Michelle Obama's backed Healthy and Hunger Free Kids Act, requiring public schools to follow new nutritional guidelines (Yee, 2012). The Burnt Hills-Ballston Lake School District in New York State recently made the decision not to participate citing that the district lost money (May, 2013). Other districts have complained about the increase in food waste since students are now required to take food choices that they know they will not eat, only contributing to the waste problem (Yee, 2012).

Some districts are utilizing composting in their schools.   The Lyme Central School District located near Watertown, recently received a small grant from Cornell Cooperative Extension and the Development Authority of the North Country to develop a district composting program (Madden, 2013). The school district is using its – greens - excess fruit, vegetables, shredded paper, egg shells, coffee grounds and filters, which are considered high-nitrogen materials and balancing them with – browns – wood chips and

paper egg cartons to make compost to be used in the raised garden beds in the school's greenhouses. The goal is to slow the filling of the region's landfill, as well as reducing the overall garbage the district produces and the amount that needs to be hauled away.

U.S. Education Secretary Arne Duncan is urging schools to move toward digital textbooks within the next five years. "Over the next few years, textbooks should be obsolete…The world is changing. This has to be where we go as a nation" (Lederman, 2012). Although Duncan did not specifically mention the need to reduce waste or to preserve trees, the more that technology can be utilized, the less waste schools will produce. Studies show that up to 50 percent of paper use in classrooms and district administrative offices is non-essential, which leads to excessive costs, waste, and an over-reliance on paper-based processes (Briggs, 2013).

The Environmental Protection Agency (2007) advocates for an integrated waste management approach that focuses on reducing, reusing and recycling and whatever is left, disposed of safely through either burying or burning.   The US currently recycles or composts only about 33% of its municipal solid waste (MSW) (Environmental Protection Agency, 2007). Experts claim that with proper education and incentives, 60-75% of MSW could be recycled (Miller & Spoolman, 2008). Other essential aspects include consuming less by reducing, reusing items instead of throwing them away and recycling items such as paper, glass, cans, plastics, and metal. According to Miller & Spoolman (2008), reducing and reusing are preferred because they are input, or prevention approaches that address the problem before it occurs. While recycling reduces primary-resource depletion and generally reduces the environmental impact of production, experts warn that repeated recycling of a resource results in the degrading of the resource which

makes it increasingly difficult to reuse (Kirchain & Alonso, 2012). However, the largest

barrier to reduce, reuse, and recycle is consumer participation (Kirchain & Alonso, 2012).

If a consumer does not participate in these principles, especially placing an item into the

recycling stream, those resources are not recoverable. In order to expand recycling, it

must be convenient and inexpensive for the end-user. Education is an essential

component so that the benefits of recycling can be accurately communicated. System

leaders can facilitate the learning of new mental models required to alter student and staff

behaviors and habits regarding waste.

Global, Federal and State Efforts that Support Environmental Sustainability

      Global Effort. The United Nations created the World Commission on

Environment and Development (WCED) in 1983 with the purpose of developing long-

term environmental strategies for achieving sustainable development (Edwards, 2005).

The Brundtland Report (United Nations, 1987), published five years later, introduced the

term "sustainable" to the world and paved the way for the Rio Earth Summit. In 1992,

the United Nations Conference on Environment and Development (UNCED) held the

Earth Summit in Rio de Janeiro, Brazil to bring more than 180 world leaders together to

chart future actions related to environmental sustainability (US EPA, n.d.). Those

attending the Earth Summit agreed to 27 principles on environment and development,

known as Agenda 21, which emphasized the necessity of an integrated approach to the

environment, and economic social development (Dresner, 2002). President George H.

W. Bush signed for the United States. A year later on the anniversary of the Earth

Summit in 1993, President Clinton signed an executive order establishing the President's

Council on Sustainable Development (PCSD) to create U.S. policies to encourage economic growth, job creation, and environmental protection (US EPA, n.d.).

The first real opportunity of global action in addressing carbon emissions came with the Kyoto Protocol in 1997. It committed industrialized nations to an overall reduction of 5.2 per cent in their collective annual emissions of the main greenhouse gases in the commitment period of 2008-2012 compared with 1990 levels (Dresner, 2002). This reduction was actually much lower than the recommendations of the European Union, which supported a 15% reduction as their plan for ultimately reaching the necessary 60-80% reduction levels in order to limit global warming (Edwards, 2005). This resulted in a missed opportunity as the Americans were not happy with the requirements of reducing emissions and finally, President George W. Bush withdrew America's participation.

The World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 was no more productive. The United States and the oil producing countries succeeded in blocking any target to increase renewable energy and to decrease overall carbon emissions (Dresner, 2002). The lack of substantial progress to bring about needed change at the World Summit showed that global political efforts to bring about environmental sustainability were almost futile.

A decade later, the countries of the world met again, this time in Doha, Qatar. At the United Nations Climate talks in Doha, the U.N. Secretary-General Ban Ki-moon was quoted as telling the delegates that the danger signs were all around and time was running out for them to act (Harrabin, 2012). The Doha climate talks called for a mechanism requiring rich nations and the world's biggest polluters to compensate poor nations for

loss and damage due to climate change (Morales & Krukowska, 2012). The United States was not very supportive of this for fear that it could be too costly. The Doha climate talks ended with an agreement that extended pollution limits under the Kyoto Protocol, which only covers about 15% of global emissions since Canada, Japan, New Zealand, and Russia opted out, and the US rejected it because it did not impose any binding commitments on China and other emerging economies (Ritter & Casey, 2012). The 2013 outlook from the Energy Information Administration projected the United States to have only a 9% reduction in energy-related carbon dioxide emissions by 2020 – and emissions would then creep back up again by 2040 (Energy Information Administration, 2013). These emission rates are a far cry from being able to make any real impact on global warming, especially since the US is the second greatest producer of carbon emissions, second only to China (Ritter & Casey, 2012). The lack of cooperation by the world's most powerful governmental leaders has hindered global progress.

National Effort. The first establishment of a national policy for environmental sustainability came in 1969 with the passage of the National Environmental Policy Act (NEPA) (US EPA, n.d.). Going one step further the next year, Congress approved a revision of the policy, which established the U.S. Environmental Protection Agency (EPA) as an independent agency in the executive branch of the federal government (US EPA, n.d.). The EPA then began serving as the regulating agency for the laws enacted by Congress to improve and preserve the quality of the environment, both on a national and global level. In addition to the establishment of the EPA, President Jimmy Carter created the U.S. Department of Energy during the energy crisis in 1977 to administer

policies for the research and development of energy technology and the safety of using nuclear material (US DOE, 2013).

    Guidance provided. Both the U.S. Department of Energy and the Environmental Protection Agency provide support to school districts in the form of guidance on improving energy efficiency in K-12 school buildings. The EPA also provides guidance on reducing toxic exposures at schools.

    In December 2007, Congress enacted the Energy Independence and Security Act (EISA), which required the EPA to establish voluntary guidelines for school facilities to use energy more efficiently and to reduce hazardous substances or pollution exposures at schools (US EPA. 2012). The Energy Star Program, jointly administered through the U.S. Department of Energy and the Environmental Protection Agency (EPA), operates a voluntary standards and labeling program. The U.S. Department of Energy also administers Energy Smart Schools by providing guidance on energy efficient operations and maintenance to school districts.

    The U.S. Green Building Council (USGBC) has created a rating system through their Leadership in Energy and Environmental Design (LEED) system as a way to define and measure green buildings (USGBC, 2013). The USGBC certifies new buildings with its LEED rating system, which is based on a number of factors including the efficiency of water and energy, use of sustainable resources and materials, the building design and indoor environmental quality (USGBC, 2013). Since its inception in 2000, nearly 500 schools have achieved this coveted certification with 1700 more in the process (USGBC, 2013).

State Effort. There are more than 20 agencies that all have some role in administering New York State's energy policy and New York State's response to climate change and resource depletion (Cuomo, 2010). New York State ranks 3rd in the nation for energy efficiency according to the American Council for an Energy-Efficient Economy (ACEE) (ACEE, 2012)

Support to school districts. A number of agencies provide support for K-12 school districts seeking to make their buildings more energy efficient through retrofits or new construction.

New York State Energy Resource and Development Authority (NYSERDA) and their Energy Smart School's Program (2013) have assisted over 1000 schools in achieving at least a 22% efficiency improvement.   NYSERDA (2013) offers a number of programs to school districts designed to improve energy efficiency which include technical assistance, incentives, rebates and a free benchmarking analysis of energy usage. In addition, high performance design guidelines for the K-12 school sector were created in 2007 in partnership with the New York State Education Department (2007) in the New York Collaborative of High Performance Schools (NY-CHPS) program for all newly constructed school buildings.

The New York Power Authority (NYPA) Energy Services for Schools Program helps to provide the energy audit, design, construction and financing for energy efficient projects to school districts and reports that it has saved New York State's schools $37 million annually (Optimal Energy, 2013).   Since its inception in 1991, NYPA has facilitated 641 projects in 1,286 non-charter school buildings throughout New York State, representing roughly 30% of K-12 school buildings statewide (New York State Education

Department, 2013b).   In addition, the Long Island Power Authority (LIPA, 2013) has

partnered with over 100 of Long Island's 124 school districts since 2000 to reduce energy

consumption. In 2012, LIPA completed over 171 energy efficiency projects in over 150

schools, totaling nearly $5 million in rebates providing energy savings of 9.6 million

kWh per year (LIPA, 2013)

The New York State Office of the Comptroller (Research Brief, 2008)

recommends that public schools use energy performance contracting to finance major

infrastructure improvements. Article 9 of New York State Energy Law (N.Y. Eng. law §

9-103) establishes the requirements that allow school districts to enter into Energy

Performance Contracts (EPCs) as a way to promote energy conservation, alternate

sources of energy and business activity. A performance contract is an agreement between

an energy services company (ESCO) and a school district, where the ESCO assumes

responsibility for reducing the energy consumption by installing energy efficient

measures and then recoups its investment through contracted payments, which represent a

portion of the energy savings that the organization receives from the efficiency measures

(Granade, H., Creyts, J., Derkach, A., Farese, P., Nyquist, S., & Ostrowski, K., 2009).

NYSED Facilities Planning is responsible for approving all EPCs for school districts.

School districts must submit their proposed project including the scope and nature of

work to be performed, a detailed breakdown of the energy savings to be derived each

year and for the duration of the contract and a process for ensuring that districts have

obtained financing at the lowest cost possible. According to the New York State

Comptroller's Office, only 15 percent of New York's public schools have undertaken

building energy audits that evaluate potential updates to heating, ventilation and air

conditioning (HVAC) systems, improvements to window and structural seals, checking insulation and roofing (Research Brief, 2008). The New York Energy Smart Office reports that energy audits also need to go a step further to assesses the amount of electricity demanded at any given time from plugged-in office items such as computers, printers, water coolers, copying machines and vending machines (Research Brief, 2008).

Cutting energy costs for schools. The Alliance for Quality Education (AQE), a New York State advocacy organization, reports that school districts would be able to cut costs related to energy use by as much as 25% if their recommendations were adopted (AQE, 2011).   AQE advises that a pro-active campaign of conducting energy audits for all schools in New York State be administered through NYPA and NYSERDA to identify energy efficient upgrades by district. AQE advocates that NYPA and NYSERDA offer a comprehensive service to school districts, similar to one-stop shopping, which would include the energy audit, installation, and financing.   Other recommendations from AQE include exempting school districts from payment of the systems benefit charge (SBC) on energy bills, which is a cost that is passed on to the local property taxpayer through higher school taxes. Lastly, regions should explore energy purchasing consortia through their local BOCES.

The New York State School Boards' Association (2008) advocates that the state consider insulating school districts from the effects of energy cost spikes above the rate of inflation. They also recommend that the benefit of becoming a customer of NYPA be extended to all school districts that apply. This would allow school districts exemption from surcharges for stranded costs, system benefit charges, and renewable energy portfolio costs.

Environmental regulations. The New York State Education Department (NYSED) – Facilities Planning, is responsible for administering Chapter 85 of the New York State Laws of 2010 that prohibits the use of pesticides on public and nonpublic school playgrounds, playground equipment, turf, athletic, and playing fields (Chertok & Miller, 2011). The goal of the law is to promote the use of integrated pest management (IPM), alternative methods of pest control, and reduce children's exposure to pesticide products (New York State Education Department, 2013).

Summary

There remain significant gaps in formalized research and literature as it relates to superintendent leadership in the context of environmental sustainability in public school districts.   This study addresses that gap by researching superintendent leadership in regard to leadership strategies and leadership actions, and their relationship to superintendent knowledge, value and priority of environmental sustainability. The following chapter describes the research process employed for this study with the intent of adding valuable insight to the literature on the topic of superintendent leadership and environmental sustainability in public school districts in NYS.

CHAPTER III: METHODS

This chapter details the actions taken by the researcher and describes the research design, sampling, instrumentation, data collection, and analysis procedures used in this study. As described in Chapter I, this quantitative study was designed to investigate superintendent perceptions of environmental sustainability and the extent to which superintendents in New York State believe they have led their districts in integrating environmental sustainability into district structures, policies and practices. This exploratory study investigated self-reported superintendent participation in leadership strategies and leadership actions that support environmental sustainability and how they relate to a superintendent's knowledge, value and priority of environmental sustainability.

Research Design

Superintendents were questioned through an online survey (Appendix A) administered through Survey Monkey. The Wheel of Change Toward Sustainability Model, developed by Doppelt (2010), was used as the lens to assess the extent to which superintendents have incorporated environmental sustainability into district structures, policies, and practices. This research study was designed as quantitative, which according to Creswell (2008, p. 46) involves the researcher asking "specific, narrow questions, collecting quantifiable data from participants, analyzing numbers using statistics and conducting the inquiry in an unbiased, objective manner." This study assessed superintendents' perceptions of their leadership efforts in relation to environmental sustainability. A quantitative method was more appropriate for this study because the research strove to describe trends and explain the relationship among variables (Creswell, 2008). More importantly, a quantitative study allowed for the results

to be generalized from a small number of participants to a large number of people (Creswell, 2008). The larger the number of participants, the more likely the results are representative of the target population. The deciding factor in determining the appropriateness for this research design was the ability in quantitative research to make generalizations from the results. The instrument used for data collection was a researcher-developed survey, designed to measure and quantify the variables at one point in time.

This study utilized a descriptive research design that measured the status of the superintendents' perceptions of environmental sustainability at a specific moment in time (Creswell, 2008; Vogt & Johnson, 2011). The survey research allowed the researcher to gain information from a sample of superintendents regarding trends, attitudes, or opinions relating to environmental sustainability and then generalize from the sample to the target population (Creswell, 2008). A descriptive, correlational design was suitable for the collection and analysis of data for this study. The descriptive design revealed the extent to which superintendents believed they have led their school districts in environmental sustainability efforts, while the correlational design allowed for an assessment of the relationships between the variables.

The use of Survey Monkey was appropriate for collecting data from New York State superintendents because of easy access and convenience over the Internet. It was also more cost effective than regular mail, which was a legitimate reason for selecting it as the method for data collection. Superintendent emails were obtained from The New York State Education Department, as they are public information.

The researcher developed five research questions, which provided the framework for analyzing superintendent perceptions and self-reported leadership participation within the context of environmental sustainability.

Research Questions

This study was designed to address the following questions regarding superintendent leadership and environmental sustainability in New York State.

1. How do superintendents in New York State view environmental sustainability?

2. To what extent do superintendents believe they have applied leadership strategies, leadership actions and accessed available resources in support of environmental sustainability?

3. What is the relationship between leadership attributes (knowledge, value and priority of environmental sustainability) and leadership strategies within the context of environmental sustainability?

4. What is the relationship between leadership strategies and leadership actions within the context of environmental sustainability?

5. What is the impact of demographics on leadership attributes, strategies and actions?

Sample

New York State superintendents, excluding New York City, were selected to complete the survey because of their overall knowledge of district operations. New York City was not included in this study because of their dissimilar governance structure as well as their school district being substantively different from the rest of the state. Approval to conduct the study was obtained from the Institutional Review Board at the

Sage Colleges in Albany, New York (Appendix B).

Sampling Method

Email addresses were provided by the New York State Education Department (2012) based upon New York State public school superintendents in service as of January 1, 2013. The researcher sent out the online survey through www.surveymonkey.com and had reason to believe that a total of 669 superintendents received it and were afforded an opportunity to participate. While the initial goal was for the survey to be sent to all 696 of New York State's public school superintendents, the opt-out feature in Survey Monkey prevented 27 superintendents from receiving the email through Survey Monkey. A total of 126 superintendents responded to the survey comprising a 19% response rate. There were 11 partial completers plus two superintendents who opened the survey but failed to answer any of the questions. While sending the survey through email saved time and money, there were issues that may have presented obstacles including emails lost sent to spam, or district filters that prevented emails from reaching the desired addresses. One superintendent reported that he had never received the email from Survey Monkey. Upon further investigation, it appeared that the district filtering system had caught the emails. Since people receive an ever-increasing number of daily emails including electronic surveys, it is becoming more difficult for subjects to respond to emails including online surveys (Sheehan, 2001). Some may even feel suspicious about answering an online survey with fear that the confidentiality of the information provided may be compromised in some manner. Another hypothesis the researcher proposed was that the topic of the survey was more unique and represented an area that superintendents may not have had a comfort level with, which could have negatively influenced the response rate.

The superintendent of each district was contacted by an email through Survey Monkey with the link included to the online survey (see Appendix C).   This system ensured that respondents could only complete the survey once. In the email, superintendent participation was requested. Superintendents were informed of the purpose of the study, the method of data collection, and the confidentiality of both data and district participation. Participants were informed that the survey would take approximately 10-12 minutes to complete. The researcher minimized risk to the participants by informing them that they could decline participation, did not have to answer any questions with which they were not comfortable, could terminate the survey at any time and that their participation was voluntary.   If the superintendent agreed to participate, that constituted informed consent. The superintendents were sent a follow-up email one week after receiving the first email from the researcher (see Appendix D). The email again described the study and provided the link to the online survey. Another follow-up email was sent two weeks after receiving the first email (see Appendix D). These two reminders helped to maximize the survey response rate. There were 62 responses after the initial email, 49 respondents after the second email reminder, and 15 responses after the last email was sent.

Instrument and Data Collection Method

The survey was developed by the researcher based on the work of numerous theorists in the field of environmental sustainability and leadership (Bennis, 2007; Doppelt, 2010; Dunphy, Griffiths, & Benn, 2007; Goodland, 1995; Heifetz, 1994; Judkoff, 2012; Morelli, 2011; Scharmer 2007; Scharmer & Kaufer, 2013; Senge et al., 2008; Spoolman & Miller, 2009; U.S. Department of Energy, n.d.; U.S. Environmental

Protection Agency, 2011). The questionnaire was made up of six categories. Part I collected information on participant and district profiles. These four questions were fill-in-the-blanks. Most of the other questions in the survey gathered quantifiable data through a four-point Likert scale. According to Nardi (2006), a good way of writing closed-ended survey questions is to "measure people's attitudes and opinions with intensity scales, or a Likert scale" (p. 75). Likert scales are effective in "assessing the degree of agreement with or support for a belief, policy, or practice" (Vogt, Gardner, & Haeffele, 2012, p. 26). A four-point scale was used to prevent respondents' neutrality and to encourage agreement or disagreement. The scale measured superintendents' perceptions of the level of district implementation of environmental sustainability through leadership strategies and leadership actions. One (1) signified not implemented, two (2) a partial level of implementation, three (3) mostly implemented, and four (4) fully implemented. Part II (eight questions) collected data on superintendent perceptions of their leadership in implementing the district's environmental sustainability efforts. Part III (eleven questions) collected information on superintendent perceptions of the level of district engagement in a systems approach to environmental sustainability. Part IV (eight questions) collected data on superintendent perceptions of the level of district engagement of staff and students in energy and water conservation. Part V (eleven questions) collected data on superintendent perceptions of the level of district engagement in the energy efficiency of buildings. Part VI (nine questions) focused on superintendent perceptions of the level of district engagement in the reduction of waste. For each page of the questionnaire, a percentage-completed indicator bar appeared at the top. This notified participants of how much further they had to go to complete the

survey. This also served as an incentive marker to get to 100%. In total, there were 51 questions seeking input from the respondents.

The survey data generated from Survey Monkey was downloaded to the statistical software IBM Statistical Package for the Social Sciences (SPSS) for Windows version 21.0 (IBM SPSS, Inc., 2012) for further analysis. The superintendents that participated reflected varying wealth, size, needs, and resources of districts in New York State. Urban superintendents represented 5% of the respondents, suburban superintendents represented 32% and rural superintendents were the largest group responding at 61%.

Methods for Addressing Reliability and Validity

The reliability of the researcher-developed questionnaire was determined through the use of Cronbach's alpha, SPSS 21 statistical package, during data analysis. Cronbach's alpha "measures the internal reliability or consistency of the items in an instrument, index or scale," especially those that have "more than two answers, such as Likert scales" (Vogt & Johnson, 2011, p. 86). According to George and Mallery (2003), the closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. Cronbach's alpha reliability coefficient for this researcher-developed survey was .93 and according to George and Mallery (2003) a coefficient greater than .9 indicates an excellent rating. Therefore, Cronbach's alpha for this study indicated it was highly internally consistent.

Table 1

Cronbach's Alpha: Internal Consistency

Cronbach's Alpha	Cronbach's Alpha on Standardized Items	N-Number of Items
.932	.936	44

To determine the face validity of the instrument, the draft survey was sent to five retired superintendents from New York State, a panel of experts, for their review and comments. Face validity requires the researcher to ask a panel of expert judges to determine whether or not the measure seems valid, or makes sense (Vogt & Johnson, 2011). These retired administrators had direct knowledge of the extent to which these efforts had been addressed in their former school districts and provided valuable feedback to the researcher in a number of areas. This panel of experts ensured the questions were clearly worded and unambiguous and that the survey questions addressed the research questions. They also recommended the elimination of unnecessary questions as well as the addition of others. Their perspective was important in helping to determine the validity of the survey instrument. The final survey was revised to reflect their comments.

Ethical Considerations

The researcher collected only self-reported data from superintendents. Survey Monkey acted as the custodian of the data, safeguarded respondents' email addresses and kept the data securely stored on servers located in the United States. The researcher used the option within Survey Monkey, which prevented the IP addresses of the participants from being disclosed to the researcher. Therefore, the researcher did not have access to the identity of the individuals completing the survey through their IP addresses. Once the data were collected, the survey results were downloaded from Survey Monkey directly into SPSS 21 for analysis. The only individuals with access to the data were the principal investigator and the doctoral candidate. The data were stored on the researcher's personal lap top computer which was password protected during data analysis. The data

were destroyed at the completion of the study. All hard copies of the data were shredded. All electronic versions of the data (computer and flash drives) were deleted and then emptied from the trash. No individually identifiable data were used or published in any of the reports generated from this study, as the results of the research were reported in aggregate form.

Potential risks, although minimal, included the possibility of a subject having a negative reaction to questions on the survey. Another possible risk existed if Survey Monkey were to erroneously disclose the participants' IP addresses to the researcher. Fortunately, the IP addresses were not disclosed the researcher. Additionally, there was minimal risk that the researcher's personal computer could have been compromised and an unauthorized person could have gotten access to the data. None of these possibilities occurred. Participants were also told that the data would be kept secure on the researcher's personal computer, which was password protected and that the researcher would destroy the data upon completion of the study.

Data Analysis

Both descriptive and inferential statistics were used during data analysis. Descriptive statistics were used to describe the participants' demographic characteristics using percentages and frequency distribution. These measures helped to describe the sample population of superintendents through such demographic information such as years as superintendent of current district, district type, district enrollment, and district free and reduced lunch rate.

Descriptive statistics were also used to describe the data for Research Question 1 and Research Question 2. Descriptive statistics involve "procedures for summarizing,

organizing, graphing, and in general, describing quantitative data" (Vogt & Johnson, 2011, p. 104). The descriptive methods included frequency counts, percentages, means and standard deviations. Frequency counts refer to the number of responses in a given category, while the mean is the average and standard deviation is the spread of the responses, or the amount the scores deviate from the mean.

Inferential statistics were used to answer Research Questions 3 and 4. Inferential statistics involves making inferences, or predictions, about a "population based on data in a sample drawn from that population" (Vogt & Johnson, 2011, p. 104). The inferential methods included Pearson Product Moment correlations, chi square analysis, cross tabulations and multiple regression analysis (MRA). Correlations exposed the relationships, either positive or negative, between the variables. The correlation coefficients were interpreted by applying Davis (1971) descriptors (negligible = .00 to .09; low =.10 to .29; moderate = .30 to .49; substantial =.50 to .69; very strong = .70 to 1.00). Chi square was used to test for "statistical significance, not to describe a sample" (Vogt & Johnson, 2011, p. 397). Multiple regression analysis involved "evaluating the effects of more than one independent variable on a dependent variable" (p. 243). Chi square analyses were used to determine if there were any statistically significant differences between observed and expected frequencies (Vogt & Johnson, 2011). The cross tabulation provided additional information on the characteristics of the variables where the cell frequency count, expressed as a percentage of the row total, was most different from the total column percentage (Grover & Vriens, 2006). This allowed for patterns to be observed by viewing cells with higher than expected observed frequencies and those with lower than expected frequencies. Chi square and cross tabulations were

applied to Research Question 5 to gain greater insight into the relationships among the variables with the demographic data.

Once data were collected through the survey, the researcher measured the extent to which the superintendents believed they have led their school districts in implementing environmental sustainability. The data were analyzed in accordance with the study's research questions so that each question could be fully explored and the relationship among the variables could be determined. These research questions provided a blueprint for analyzing the data so that trends, patterns, and explanations could be evaluated (Creswell, 2008). It is up to the researcher to be able to examine the numeric data so that a story emerges. Therefore, the researcher drew conclusions from the statistical results to tell the story of superintendent leadership of environmental sustainability in public schools in New York State.

Researcher Bias

Environmental sustainability was a new topic for the researcher, and therefore, the researcher possessed little bias regarding the possible outcomes of this study.

Summary

Chapter III describes the research design, sampling method, instrumentation, data collection, and analysis procedures that were used in this study. The intent of this study was to investigate superintendent perceptions of environmental sustainability and the extent that New York State public school superintendents believe they have led their school districts in implementation efforts. A quantitative, descriptive, correlational design was the appropriate method to examine the relationships identified for this study. The sample included superintendents of public school districts in New York State,

excluding New York City. Superintendents were surveyed online through Survey

Monkey. A panel of experts provided feedback on the survey questions and the survey

was revised based on their comments. The survey results were downloaded from Survey

Monkey into SPSS 21 for analysis. Both descriptive and inferential statistics were used

during data analysis.

CHAPTER IV: ANALYSIS OF THE DATA

This quantitative study was designed to investigate superintendent perceptions of environmental sustainability and the extent to which superintendents in New York State believe they have led their districts in integrating environmental sustainability into district structures, operations and practices. This exploratory study investigated superintendent self-reported participation in leadership strategies and leadership actions that support environmental sustainability as well as the influence of a superintendent's knowledge, value and priority of environmental sustainability.   The Wheel of Change Toward Sustainability Model, developed by Doppelt (2003, 2010), was used as the lens to assess the extent to which superintendents believe they have incorporated environmental sustainability measures into district structures, policies and practices.

Superintendents from public schools in New York State completed an online survey and the data from those surveys were used to address the following research questions:

1. How do superintendents in New York State view environmental sustainability?

2.   To what extent do superintendents believe they have applied leadership strategies, leadership actions, and accessed available resources in support of environmental sustainability?

3. What is the relationship between leadership attributes (knowledge, value and priority of environmental sustainability) and leadership strategies within the context of environmental sustainability?

4.   What is the relationship between leadership strategies and leadership actions within the context of environmental sustainability?

5. What is the impact of demographics on leadership attributes, strategies and actions?

Descriptive statistics were used to investigate Research Questions 1 and 2 by examining the frequencies, percentages, means, and standard deviations of the variables. More advanced statistical tests (Pearson product-moment correlation, chi square, cross tabulations and multiple regression analysis) were applied to Research Questions 3 and 4 to examine patterns in responses as well as the magnitude and statistical significance of relationships among the variables. Chi square and cross tabulations were applied to Research Question 5 to gain greater insight into the relationships among demographic data with leadership attributes, strategies and actions.

For the purposes of achieving greater clarity and efficiency in the text, environmental sustainability will also be referred to as ES. Items in the survey were researcher-developed and based on the work of multiple theorists in the field of leadership and environmental sustainability. There were a total of 51 items in the survey, which were predominantly measured using a four-point Likert scale with the labels: Not at All (1), Partially (2), Mostly (3) and Fully (4). The complete survey, Environmental Sustainability in New York State Public Schools, can be found in Appendix A.

Sample Characteristics

Participants in the study consisted of 124 superintendents out of 669 school districts in New York State. The demographic information for both the superintendents and the districts for which they were providing self-reported data was derived from the first four questions of the survey: 1) Years as superintendent of this district; 2) District type – Urban, Suburban or Rural; 3) District enrollment; and 4) District Free and

Reduced Lunch rate. While the superintendents entered their responses in the exact

number of years they have served as the superintendent, district enrollment and Free and

Reduced Lunch, for ease in reporting the researcher classified the data into four

categories: 1-3 years; 4-6 years; 7-10 years; and 11+ years. The frequency and percentage

data for these first four questions are shown in Table 2 below.

Table 2

Description of the Sample of Superintendents and Their School Districts

Variable	Frequency	Percentage
Years in This District	N=124	
1-3 years	61	49.2
4-6 years	40	32.2
7-10 years	15	12.1
11+ years	7	5.6
District Type	N=121	
Urban	6	4.8
Suburban	39	31.5
Rural	76	61.3
District Enrollment	N=124	
0-750	30	24.2
751-1500	34	27.4
1501-3000	28	22.6
3000+	30	24.2
Free and Reduced Lunch	N=124	
0-25%	37	29.8
26-50%	56	45.2
51-75%	22	17.7
76-100%	2	1.6

Urban superintendents represented 5% of the respondents, suburban

superintendents represented 32% and rural superintendents were the largest group

responding at 61%. This distribution does not reflect the actual break down by district

type in New York State where urban districts represent 9% of districts, suburban districts

make up 39% of districts, and 52% of districts are classified as rural (New York State

Center for Rural Schools, 2012; New York State Education Department, 2011). The sample for this survey included an overrepresentation from those superintendents who view themselves to be from rural schools since the majority of superintendents responding indicated they were from rural schools (61%).

As shown in Table 2, the majority of superintendents indicated they were in the first three years (49%) of their first contract in that district. While not a perfect comparison, this corresponds to the percentage of new superintendents in New York State, while the average number of years for veteran superintendents, as reported by the New York State Council of School Superintendents, was 6.9% (Fale, Ilke & Terranova, 2012). District enrollments were closely distributed, but with those superintendents representing districts with enrollments between 751-1500 as slightly higher. This corresponds with enrollment figures by district in New York State (New York State Department of Education, 2010). Lastly, superintendents representing districts with Free and Reduced Lunch rates between 26-50% comprised the largest group of respondents. This percentage also corresponds with the average rate in New York State (New York State Department of Education, 2012).

Superintendent Perceptions of Environmental Sustainability

The first research question explored how superintendents in New York State view environmental sustainability. In order to address this research question, participants were asked questions that related to leadership attributes that support environmental sustainability. More specifically, superintendents were asked about their knowledge of ES, the extent that is was a value for them, and the extent that superintendents viewed it as a priority when making district decisions. Descriptive statistics were used to address

Research Question 1. Table 3 provides the frequencies and percentages from the survey

responses related to superintendent leadership attributes. Superintendents (93%) reported

that they were at least somewhat knowledgeable on issues of environmental

sustainability. However, only 12% indicated that they possessed the highest level of

knowledge, which was the lowest rating of the three leadership attributes (knowledge,

value and priority). Environmental sustainability was also a high value for 42% of the

superintendents. However, when considering whether or not environmental sustainability

was also a priority, the overall percentage decreased considerably in the high response

category. It was only a medium priority for 63% and a high priority for 15%.

Table 3

Leadership Attributes: Counts, Frequencies, Means and Standard Deviations

	Not at All	Low	Medium	High	M	SD
Knowledge of ES (Q5)	(8) 7%	(46) 40%	(46) 40%	(14) 12%	2.5	.79
Extent ES is a value (Q6)	(2) 2%	(12) 10%	(53) 46%	(49) 42%	3.2	.71
Extent ES is a priority (Q7)	(4) 4%	(22) 19%	(72) 63%	(17) 15%	2.8	.68

Once the raw data were evaluated using frequencies and percentages, the mean

and standard deviations were used to further examine the superintendent responses. The

likert scale ranged from 1, indicating a very low level, to 4, which was the highest level

presented. The question with the highest mean was the extent that superintendents cited

ES as a value ($M = 3.2$) indicating that environmental sustainability was strongly valued

by these superintendents.   Superintendent priority of ES was much lower ($M=2.8$)

indicating a discrepancy between reported value and priority.   Superintendent self-

reported knowledge of ES was the lowest ($M=2.5$) of all three of the leadership attributes,

indicating that superintendents consider themselves as less knowledgeable about ES. The leadership attribute, value, achieved one of the highest mean scores in the entire survey.

Leadership Strategies and Actions that Support Environmental Sustainability

The second research question applied descriptive statistics and examined the extent that superintendents believe they have applied leadership strategies, leadership actions, and accessed available resources in support of environmental sustainability.

Inspiring others to engage in ES. Superintendent self-reported involvement in leadership strategies that inspire others to engage in ES by establishing a compelling need (*M*=2.4) and by reinforcing and rewarding behavior that supports ES showed minimal involvement (*M*=2.4). Only half (52%) of the superintendents reported being personally involved in establishing a compelling need as well as reinforcing and rewarding behavior (53%) that supports environmental sustainability (Table 4).

Table 4

Inspiring Others to Engage in ES: Counts, Frequencies, Means and Standard Deviations

	Not at All	Limited	Involved	Highly	M	SD
Extent you have been personally involved in establishing a compelling need for students and staff to engage in ES (Q11)	(11) 10%	(45) 39%	(52) 45%	(8) 7%	2.4	.76
Extent you have been personally involved in reinforcing and rewarding behavior that supports ES (Q12)	(15) 13%	(38) 34%	(49) 43%	(11) 10%	2.4	.84

Doppelt (2010) reports that translating ES into meaningful action will require a dramatic shift in the mental paradigms and behaviors of employees and that establishing a compelling need is the greatest leverage point for achieving ES. The data from this

survey revealed that superintendents reported minimal involvement in use of the strategy of establishing a compelling need.

Reinforcing the message of environmental sustainability. Participants were asked questions relating to superintendent perceptions of their leadership in encouraging students and staff to engage in behaviors that support conservation efforts and the reduction of waste.

Table 5

Reinforcing the Message of ES: Counts, Frequencies, Means and Standard Deviations

	Not at All	Minimally	Routinely	All the Time	M	SD
Extent you personally encourage staff/students' participation in conservation through reminders, signs and training (Q24)	(9) 8%	(41) 36%	(58) 51%	(6) 5%	2.5	.71
Extent you personally encourage staff/students' participation in conservation efforts through incentives (Q25)	(51) 45%	(50) 44%	(11) 10%	(1) .9%	1.6	.68
Extent you personally encourage staff/students' participation in conservation through curriculum (Q26)	(10) 9%	(55) 49%	(44) 39%	(4) 4%	2.3	.69
Extent you personally encourage staff/students' participation in conservation through student clubs (Q27)	(23) 20%	(42) 32%	(46) 41%	(8) 7%	2.3	.88
Extent staff/students are encouraged to reduce waste through reminders, signs and training (Q43)	(5) 5%	(47) 42%	(54) 48%	(7) 5%	2.5	.68
Extent staff/students are encouraged to minimize printing and usage of paper (Q44)	(3) 3%	(34) 30%	(63) 56%	(12) 11%	2.7	.67

As can be seen from Table 5, the majority of superintendents reported that they routinely (51%) encourage staff and students' participation in conservation efforts

through reminders, signs and training but only 5% reported that they use of this strategy all the time. The use of incentives (Table 5) as a way to encourage participation in conservation efforts was extremely low with 45% reporting their districts do not use them at all. Less than half of the superintendents reported that their districts at least routinely encourage conservation efforts through the curriculum (42%) and student clubs (48%). Overall, the mean results (Table 5) show that superintendent self-reported involvement in the leadership strategies that reinforce the message of conservation is limited. Superintendent self-reported involvement in encouraging staff and students to minimize printing and usage of paper was the highest mean score ($M = 2.7$) out of all of the leadership strategies that encourage and reinforce a change in behavior.

Leveraging components through a systems approach. Participants were asked questions that related to implementing a system's approach to environmental sustainability through the leveraging of components. Doppelt (2010) refers to this as restructuring the rules of engagement by creating new strategies, and aligning the critical parameters of the organization. More specifically, Doppelt (2010) urges system leaders to align the organization's internal systems, structures, policies and procedures with ES. Alignment helps all employees and stakeholders to move in the same direction as a system, instead of an assortment of separate parts, a critical element of a systems approach, which was weakly demonstrated by the data.

In Table 6, it can be seen that the majority of superintendents (52%) reported that they usually take environmental sustainability into consideration when making district decisions. However, 64% indicated that they have minimally or not at all aligned structures, policies and procedures to support ES and even fewer reported (69%) that they

have minimally to not at all altered the district's vision or mission to support

environmental sustainability. These findings suggest that in the majority of those

districts, the framework is missing to guide decisions and actions in support of

environmental sustainability. Doppelt (2010) advises that the third key leverage point is

for an organization to alter its goals by adopting a vision and principles to guide the

transition to ES, an area for which superintendents indicated minimal involvement ($M =$

2.1).

Table 6

A Systems Approach: Counts, Frequencies, Means and Standard Deviations

	Never	Sometimes	Usually	Always	M	SD
Extent ES is taken into consideration when making district decisions (Q8)	(4) 4%	(33) 29%	(60) 52%	(18) 16%	2.8	.73
	Not at All	Minimally	Substantially	Fully		
Extent district's vision and mission have been altered by establishing guiding principles for ES (Q9)	(16) 14%	(63) 55%	(36) 31%	(0) 0%	2.1	.65
Extent structures, policies and procedures have been aligned to support ES (Q10)	(8) 7%	(66) 57%	(41) 36%	(0) 0%	2.2	.58
Extent district has clearly defined energy performance objectives, goals, strategies and expected outcomes (Q14)	(19) 17%	(43) 37%	(38) 33%	(15) 13%	2.4	.91
	Yes		No			
District energy policy (EP) (Q13)	(49) 43%		(64) 57%			

As noted in Table 6, the majority of superintendents (57%) reported that their

districts do not have an energy policy in place. Similarly, only 13% of superintendents

reported that their districts have fully defined energy performance objectives, goals,

strategies and expected outcomes. Doppelt (2010) maintains that a significant leverage

point in transitioning toward ES is to align all of the most important aspects of

organizational performance – leadership, vision, goals, structures, strategies, and

decision-making – so they all have the same underlying goals, the same standards and

send the same message.   Again, that framework appears to be missing in most districts to

support strategies and outcomes in favor of ES.

Table 7

Strategies and Energy Efficiency: Counts, Frequencies, Means and Standard Deviations

	Not at All	Partially	Mostly	Fully	Not Sure	M	SD
Extent district measures the energy efficiency of individual buildings (Q32)	(6) 5%	(28) 25%	(33) 29%	(46) 40%	(1) .9%	3.0	.94
Extent district makes energy decisions based on the collection, analysis or benchmarking of data (Q33)	(7) 6%	(32) 28%	(35) 31%	(38) 34%	(1) .9%	2.9	.95
Extent O&M staff are trained to operate, service and maintain the equipment to maximize energy efficiency (Q34)	(2) 2%	(26) 23%	(57) 50%	(29) 25%	N/A	2.9	.74

Superintendents were asked the extent to which they engaged their districts in

leadership strategies related to upgrading their facilities to be more energy efficient as

well as establishing operating procedures that reduce and maximize energy consumption

(Table 7). For the most part, superintendents (69%) reported that they at least mostly

measure the energy efficiency of individual buildings and use data (65%) to make energy

decisions ($M = 3.0$).

Table 8

Accessing Resources: Counts, Frequencies, Means and Standard Deviations

	Not Helpful	Somewhat Helpful	Helpful	Very Helpful	M	SD
The availability of information helped district become more engaged in ES (Q16)	(11) 9.6%	(58) 50.4%	(41) 35.7%	(5) 4.3%	2.3	.71
District culture helped district become more engaged in ES (Q17)	(14) 12.2%	(46) 40%	(45) 39.1%	(10) 8.7%	2.4	.81
Values of community helped district become more engaged in ES (Q18)	(14) 12.3%	(47) 41.2%	(43) 37.7%	(10) 8.8%	2.4	.81
The current state funding formula helped district become more engaged in ES (Q19)	(61) 53.5%	(28) 24.6%	(18) 15.8%	(7) 6.1%	1.7	.93
Funding through grants, loans or rebates helped district become more engaged in ES (Q20)	(28) 24.8%	(42) 37.2%	(29) 25.7%	(14) 12.4%	1.4	.72

The majority of superintendents indicated that the availability of information on sustainability (Table 8) has at least somewhat helped their districts engage in ES. The high response categories were less than 9% for both district culture and community values. One possible interpretation of these data is that neither district culture nor community values are driving the push for these superintendents to lead their districts toward ES.

The majority of superintendents (54%) indicated that the current state funding formula has not been helpful in assisting their districts to become more engaged in environmental sustainability. This was in addition to superintendents reporting that funding through grants, loans or rebates was not all helpful.

Actions that leverage the larger system. Actions that leverage the larger system involve restructuring the rules of engagement through greater collaboration (Doppelt,

2010). According to Table 9, one area that was identified as being successful was the use

of regional energy consortiums where 75% of the superintendents reported that their

districts were purchasing energy through a regional energy consortium as a way of

reducing the cost.

Table 9

Leveraging the Larger System: Counts, Frequencies, Means and Standard Deviations

	Yes			No		
District purchases energy through a regional energy consortium (EC) (Q22)	(87) 70%			(29) 25%		
District performs energy audits every five years (Q40)	(87) 77%			(26) 23%		
	Not Using	Partially	Mostly	Fully	M	SD
Extent district is using renewable energy such as solar, wind, or geothermal (Q21)	(78) 67%	(30) 26%	(4) 3%	(4) 3%	1.4	.72
	No Partnerships	1	2	3 or more	M	SD
Extent district has partnerships with adjacent school districts and/or municipalities to reduce energy costs (Q15)	(39) 34%	(23) 20%	(24) 21%	(29) 25%	2.3	1.1

Table 9 also shows that 77% of superintendents reported that their districts

perform energy audits every five years. This number is substantially higher than the 15%

figure reported for New York's public schools by the Office of the New York State

Comptroller in 2008 (Research Brief, 2008). There were low participation levels in the

areas of energy partnerships and renewable energy sources. Of those superintendents

responding, 34% stated their districts do not have any partnerships in place with either

adjacent school districts or municipalities to reduce energy costs and 67% reported that

their districts were not using any sources of renewable energy.

Actions that promote the efficiency of buildings. As displayed in Table 10,

superintendents reported making the greatest facility upgrades to their HVAC systems,

where 76% indicated their districts have at least mostly upgraded heating, cooling and air

conditioning to be more energy efficient. The area with the lowest reported level of

energy upgrades was to the domestic water system where only 53% of superintendents

reported that their districts have at least mostly made improvements in this area.

According to the US Department of Energy (n.d.) as much as 30% of the energy used in a

typical school is wasted because of inefficient systems and operations. Only 10% of the

superintendents indicated that the buildings in their districts have been fully retrofitted.

Table 10

Actions and Energy Efficiency: Counts, Frequencies, Means and Standard Deviations

	Not at All	Partially	Mostly	Fully	Not Sure	M	SD
Extent district made energy upgrades to heating, cooling and air conditioning (i.e. boilers, uni-vents, energy management control systems) Q36	(3) 3%	(25) 22%	(63) 55%	(24) 21%	(0) 0%	2.9	.72
Extent district has made energy upgrades to the building envelope (i.e. windows, exterior doors, roofs) (Q37)	(2) 2%	(37) 32%	(57) 50%	(17) 15%	(2) 1.6%	2.8	.76
Extent district has made energy upgrades to the electrical (i.e. high efficiency lighting, controls and occupancy sensors) Q38	(0) 0%	(34) 29%	(52) 45%	(28) 24%	(1) .9%	2.9	.76
Extent district has made energy upgrades to the domestic water system (i.e. low flow fixtures, water saving devices) Q39	(8) 7%	(44) 38%	(40 35%	(21) 18%	(2) 1.7%	2.6	.90
Extent district has retrofitted buildings to make them more energy efficient (Q35)	(3) 3%	(45) 40%	(55) 48%	(11) 10%	NA	2.6	.69
Extent district has implemented the energy efficiency recommendations from district's most recent energy audit (Q41)	(4) 4%	(20) 17%	(65) 56%	(19) 17%	(7) 6%	2.7	.98

97

Table 10 shows that only 24% of superintendents reported that their districts have fully upgraded the electrical systems. While 77% of superintendents reported that their districts perform energy audits every five years, only 17% reported that their districts have fully implemented the energy efficiency recommendations from their most recent audit. While 64% of superintendents reported that their districts have mostly made upgrades to the building envelope, only 15% reported having fully made these upgrades. This was the lowest level for all the upgrades reported in the "fully" response category.

Actions that promote the reduction of waste.   Recycling efforts are strong as roughly 90% of the superintendents responded that their districts at least routinely recycle a multitude of materials and items. Table 11 shows that 59% of superintendents reported that their districts always recycle obsolete technology, equipment and furniture.

Table 11

The Reduction of Waste: Counts, Frequencies, Means and Standard Deviations

	Not at All	Minimally	Routinely	All the Time	Not Sure	M	SD
Extent district recycles paper, cardboard, glass, plastic and metal (Q45)	(2) 2%	(10) 9%	(45) 40%	(56) 50%	(0) 0%	3.3	.72
Extent district recycles obsolete technology, equipment and furniture (Q46)	(0) 0%	(11) 10%	(34) 30%	(67) 59%	(0) 0%	3.5	.68
Extent district cafeterias compost food leftovers (Q47)	(53) 47%	(26) 23%	(20) 18%	(18) 7%	(6) 5%	2.0	1.19
Extent district cafeterias minimize the use of non-recyclable disposable food containers (i.e. trays, milk containers (Q48)	(7) 6%	(35) 32%	(52) 47%	(12) 11%	(5) 5%	2.7	.89
Extent district purchases green cleaning products (Q49)	(0) 0%	(7) 6%	(36) 32%	(68) 60%	(2) 2%	3.5	.63
Extent district uses integrated pest management (IPM) (Q50)	(0) 0%	(3) 2.%	(26) 23%	(82) 73%	(1) .9%	3.7	.52

The highest mean from the entire survey was the use of integrated pest management (IPM) ($M = 3.7$), indicating a very high level of usage. These results are consistent with the requirements by the Board of Regents, which amended Part 155 of the Regulations of the Commissioner of Education that requires the establishment of a least-toxic approach to IPM (§155.4(d)(2)) (NYSED, 2013)**.**

The composting of food leftovers was very low with only 7% of superintendents reporting that their districts all the time compost (Table 11) suggesting that composting is minimally being done across New York State.   Superintendent responses to this question were the most varied ($SD = 1.19$). Another area with low participation pertained to food containers where only 11% of superintendents reported that their districts always minimize the use of non-recyclable food containers.   Composting and minimizing the use of non-recyclable food containers represented the questions with the greatest number of respondents in the not sure category where it was an available option in the survey. One possible explanation could be that superintendents are less involved in making these decisions.

Superintendent Leadership and the Relationships Between Leadership Attributes and Leadership Strategies

The third research question assessed the relationships between leadership attributes (knowledge, value and priority of environmental sustainability) and leadership strategies within the context of environmental sustainability.   Pearson product-moment correlation, chi square and multiple regression analysis were used to investigate the magnitude, patterns and statistical significance of relationships among the variables.

Relationships and patterns between leadership strategies and attribute variables. Pearson product-moment correlations were used to measure the strength of linear dependence between two variables (Salkind, 2008).

Table 12

Pearson Correlations Between Leadership Attributes and Strategies

	Attributes			Strategies							
	Know-ledge	Value	Priority	Decisions	Vision	Struc-tures	Need	Rewards	Goals	Using Data	Reminder Signs Trainings
Attributes:											
Know-ledge	1										
Value	.419**	1									
Priority	.426**	.714**	1								
Strategies:											
Decisions	.527**	.579**	.678**	1							
Vision	.412**	.489**	.614**	.564**	1						
Structures	.329**	.451**	.539**	.578**	.702**	1					
Need	.535**	.455**	.576**	.580**	.617**	.538**	1				
Rewards	.391**	.389**	.464**	.430**	.471**	.477**	.712**	1			
Goals	.495**	.297**	.324**	.354**	.337**	.429**	.389**	.347**	1		
Using Data	.311**	.127	.209*	.292**	.218*	.439	195*	.280**	.427**	1	
Reminders Signs and Training	391**	.424**	.500**	.439**	.538**	.438**	.578**	.499**	.436**	.239*	1

*Correlation is significant at the .05 level (2-tailed).
**Correlation is significant at the .01 level (2-tailed).

The correlation coefficients were interpreted by applying Davis' (1971) descriptors (negligible = .00 to .09; low =.10 to .29; moderate = .30 to .49; substantial

=.50 to .69; very strong = .70 to 1.00). The correlation matrix in Table 12 shows the

relationship between the variables relating to leadership attributes and strategies. Only

the most statistically significant relationships are included in Table 12. In addition to the

Pearson product-moment correlations, the researcher applied chi square and cross

tabulations to extend the analyses to provide additional information on the patterns of the

responses. Chi square analyses were used to determine if there were any statistically

significant differences between observed and expected frequencies of superintendent

responses to individual survey questions (Vogt & Johnson, 2011). The cross tabulation

provided additional information on the characteristics of the variables where the cell

frequency count, expressed as a percentage of the row total, was most different from the

total column percentage (Rajiv & Vriens, 2006). This allowed for patterns to be observed

by viewing cells with higher than expected observed frequencies and those with lower

than expected frequencies.

  Priority of ES. The overall greatest number of statistically significant

relationships existed with the variable, priority, suggesting the relative importance of this

variable. A very strong relationship and the most significant from Table 12 was between

the extent that ES was indicated as a priority and the extent that ES was viewed as a value

by superintendents (r=.714, p<.01). Chi square revealed that in order to have a response

that ES was a high priority, it was also reported as a high value (chi square=82.013,

p<.001).   No respondents indicated that ES was a high priority without also indicating it

was a high value for them.

  There were also five substantial relationships with priority. The extent a

superintendent reported taking ES into consideration when making district decisions was

101

statistically significant (r=.678, p<.01). Of those superintendents who reported that ES was a high priority for them, 59% also indicated that they always take ES into consideration when making district decisions (chi square=76.370, p<.001). The data showed that the greater ES was identified as a priority, the more likely a superintendent indicated taking ES into consideration when making district decisions.

The data showed a strong relationship between priority and the extent a superintendent has altered the district's vision and mission by establishing guiding principles for ES (r=.614, p<.01). Of those superintendents who reported that ES was a high priority, 71% also cited that they have substantially altered their district's vision and mission by establishing guiding principles for ES (chi square=59.852, p<.001). The data showed that the greater ES was reported as a priority, the more likely a superintendent indicated that he or she had substantially altered his or her district's vision and mission to support ES.

There was also a substantial association between priority and the extent that a superintendent indicated his involvement in establishing a compelling need for students and staff to engage in ES (r=.576, p<.01). Of those respondents who indicated that ES was a high priority, all reported some level of involvement in establishing a compelling need (chi square=63.745, p<.001).

When examining the relationship between priority and the extent that a superintendent has aligned structures, policies and procedures to support environmental sustainability in his or her district, a substantial association was evident (r=.539, p<.01). Of those superintendents who indicated that ES was a high priority, 64% also reported substantially aligning structures, policies and procedures to support ES (chi

square=46.005, p<.001). Conversely, those superintendents who responded that ES was not a priority also indicated that they have not at all aligned structures, policies and procedures in their districts to support ES. The greater that ES was cited as a priority, the more likely a superintendent reported aligning structures, policies and procedures to support it.

A substantial relationship was also indicated between priority and using reminders, signs and training (r=.500, p<.01). The greater that ES was cited as a priority, the more likely a superintendent reported the district's use of reminders, signs and training to encourage staff/students (chi square=38.180, p<.001).

A moderate relationship was evident between priority and knowledge (r=.426). The greater that ES was cited as a priority, the more likely superintendents were to view themselves as more knowledgeable of ES (chi square=56.060, p<.001). Of those superintendents who viewed themselves as highly knowledgeable of ES, 43% of them also reported that ES was a high priority for them.

Taking ES into consideration when making district decisions. The variable with the next greatest number of significant relationships was taking ES into consideration when making district decisions. A substantial relationship was evident between taking ES into consideration when making district decisions and value of ES (r=.579, p<.01). Of those superintendents who responded that they always take ES into consideration when making district decisions, 78% also reported ES as a high value. The greater the reported value, the more likely the superintendent reported taking ES into consideration when making district decisions (chi square=53.429, p<.001).

A substantial relationship was clear between the extent a superintendent reported taking ES into consideration when making district decisions and the extent that a superintendent reported how knowledgeable he or she was on issues of ES (r=.527, p<.01). The more knowledgeable a superintendent indicated he or she was, the greater the likelihood he or she reported taking ES into consideration when making district decisions (chi-square=66.976, p<.001).

A substantial relationship was present between taking ES into consideration when making district decisions and aligning structures, policies and procedures (r=.578, p<.01). Of those superintendents who indicated that they always take ES into consideration when making district decisions, 67% also reported that they have substantially aligned structures, policies and procedures (chi square=59.391, p<.001).

A substantial relationship existed between taking ES into consideration when making district decisions and the extent a superintendent reported altering the district's vision and mission (r=.564, p<.01), where 61% of the superintendents who indicated that they always take ES into consideration when making district decisions also reported that they have substantially altered the district's visions and mission (chi square=51.578, p<.001).

A substantial relationship was also evident between the extent a superintendent reported taking ES into consideration when making district decisions and establishing a compelling need (r=.580, p<.01). The data showed that the greater a superintendent took ES into consideration when making district decisions, the more likely a superintendent indicated being involved in establishing a compelling need for ES (chi square=64.045, p<.001).

Establishing a compelling need for students and staff to engage in ES. There were also a number of significant relationships with the strategy, establishing a compelling need, that are worth noting. A very strong relationship was indicated (r=.712, p<.01) between the extent a superintendent reported to be personally involved in establishing a compelling need and the extent that a superintendent reported reinforcing and rewarding behavior that supports ES. The data showed that those superintendents who were more involved in establishing a compelling need were more likely to reinforce and reward behavior in support of ES (chi square=143.929, p<.001).

A substantial relationship was also evident between establishing a compelling need and knowledge of ES (r=.535, p<.01). The more knowledgeable a superintendent indicated he or she was on issues of ES, the more likely he or she was to report establishing a compelling need (chi square=56.060, p<.001).

There was a substantial relationship between establishing a compelling need and the extent a superintendent reported altering his or her district's vision and mission by establishing guiding principles (r=.617, p<.01). Of those superintendents who indicated that they were highly involved in establishing a compelling need, 88% of them also indicated that they have substantially altered their district's vision and mission by establishing guiding principles (chi square=69.517, p<.001). Conversely, 82% of those superintendents who indicated they were not involved in establishing a compelling need also indicated that they have not at all altered their district's vision and mission in support of ES.

There was also a substantial relationship between establishing a compelling need and using reminders, signs and training (r=.578, p<.01) The more involved the

superintendent was in establishing a compelling need, the more likely the superintendent was to report the use of reminders, signs and training to promote conservation efforts of students and staff (chi square=86.238, p<.001).

Other leadership strategies. There was a very strong relationship (r=.702, p<.01), between the extent a superintendent reported to have aligned structures, policies and procedures and the extent that he or she indicated altering the district's vision and mission by establishing guiding principles. Of those superintendents who reported substantially altering their district's vision and mission by establishing guiding principles for ES, 80% of them also reported that they substantially aligned structures, policies and procedures to support ES (chi square=91.810, p<.001).

While the extent that superintendents encourage the presence of ES in the district curriculum and student clubs was not significant with any other variables, they were significant with each other. There was a substantial relationship between clubs and curriculum (r=.688, p<.01). Upon further investigation the chi square comparison was also very strong (chi square=124.48, p<.001). Those superintendents (87%) who reported that they minimally encourage ES in the district curriculum also reported that they minimally encourage ES through student clubs.

Relationships between accessing resources to support ES. The following relationships were significant and provided information on resources that support the transition to ES. Table 13 shows a very strong correlation (r=.701, p<.01) between district culture and community values. Upon further investigation, the researcher identified an extremely significant chi square relationship (chi square=126.985, p.<001). The greater the identified importance of community values as a factor in helping the

106

district become more engaged in environmental sustainability, the more likely district

culture was also seen as positively impacting the district in becoming more engaged in

environmental sustainability. Of those superintendents who identified community values

as being helpful in assisting their districts in becoming more engaged in environmental

sustainability, 72% also cited that district culture had been helpful as well.

Table 13

Pearson Correlations Between Accessing Resources Variables

	Information	District Culture	Community Values	State Funding	Grants
Available Information	1				
District Culture	.649**	1			
Community Values	.526**	.701**	1		
State Funding	.252**	.344**	.283**	1	
Grants Loans and Rebates	.338**	.326**	.256**	.608**	1

 *Correlation is significant at the .05 level (2-tailed).
**Correlation is significant at the .01 level (2-tailed).

There was also a substantial (r=.608, p<.01) relationship between funding through

grants, loans or rebates and the extent the current state funding formula assisted their

districts in becoming more engaged in environmental sustainability (Table 13). Upon

further investigation, the researcher found a very strong chi square relationship (chi

square=78.823, p<.001) between these two variables where the less helpful the

respondent indicated that the current state funding formula was the less helpful the

respondent also found funding through grants, loans or rebates.

Predicting leadership strategies through leadership attributes. Several

multiple linear regression analyses were used to examine the relationships between

several leadership strategies (dependent variables) and three leadership attributes

(independent variables). To provide a greater understanding of multiple regression

analysis, R is the symbol for multiple correlation and is used for measuring the effects of

more than one predictor variable on a dependent or outcome variable, while R Square

(R^2) represents the proportion of the dependent variable variance, which is accounted for

by the combination of the independent variables (Vogt & Johnson, 2011). In the

discussion of the findings, Adjusted R Square (R^2) was used because, according to Vogt

and Johnson (2011), it gives a truer estimate of the amount of the variance so that the

finding can be generalized from the sample.

     The independent variables were the three leadership attributes: perceived level

of superintendent knowledge of ES, indicated level of superintendent value of ES and the

extent that ES was viewed as a priority. The dependent variables tested in this multiple

regression analysis included leadership strategies from the entire survey. Table 14

summarizes the results. The four most significant regression models are presented. In

each case, the multiple linear regression model was determined to be statistically

significant (p<.001).

    The results of the multiple linear regression model (Table 14) suggest that a

significant proportion of the total variation in taking ES into consideration when making

district decisions was contributed by leadership attributes (F=38.51, p<.001). The

multiple correlation coefficient (R=.72) indicated that approximately 50% of the variance

can be accounted for by the combination of leadership attributes.

Table 14

Results of Three Multiple Regression Models With Leadership Attributes and Strategies

Taking ES Into Consideration When Making District Decisions (ANOVA: F=38.51, p<.001, R=.719, R Square=.517, Adjusted R Square= .503)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	.281	.250		1.124	.264
Knowledge	.253	.068	.279	3.721	.000
Value	.146	.096	.143	1.522	.131
Priority	.481	.103	.441	4.676	.000
Establishing a Compelling Need for Students and Staff to Engage in ES (ANOVA: F=26.22, p<.001, R=.647, R Square=.419, Adjusted R Square= .403)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	.267	.282		.948	.345
Knowledge	.338	.078	.357	4.344	.000
Value	.029	.109	.027	.261	.795
Priority	.440	.118	.388	3.739	.000
Altering the District's Vision and Mission by Establishing Guiding Principles for ES (ANOVA: F=23.02, p<.001, R=.626, R Square=.392, Adjusted R Square= .375)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	.261	.248		1.053	.294
Knowledge	.146	.069	.179	2.123	.036
Value	.067	.097	.074	.695	.489
Priority	.458	.104	.472	4.417	.000
Aligning Structures, Policies and Procedures to Support ES (ANOVA: F=14.34, p<.001, R=.534, R Square=.285, Adjusted R Square= .265)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	.817	.240		3.407	.001
Knowledge	.084	.066	.117	1.275	.205
Value	.082	.093	.101	.874	.384
Priority	.342	.100	.396	3.409	.001

The results of the multiple linear regression model suggest that a significant proportion of the total variation in establishing a compelling need for students and staff to engage in ES was contributed by leadership attributes (F=26.22, p<.001). The multiple

correlation coefficient (R=.65) indicated that approximately 40% of the variance can be accounted for by the combination of leadership attributes.

The results of the multiple linear regression model suggest that a significant proportion of the total variation in altering the district's vision and mission by establishing guiding principles for ES was contributed by leadership attributes (F=23.02, p<.001). The multiple correlation coefficient (R=.63) indicated that approximately 38% of the variance can be accounted for by the combination of leadership attributes.

The results of the multiple linear regression model suggest that a significant proportion of the total variation in aligning structures, policies and procedures to support ES was contributed by leadership attributes (F=14.34, p<.001). The multiple correlation coefficient (R=.53) indicated that approximately 27% of the variance can be accounted for by the linear combination of leadership attributes.

The researcher further explored the relationships by assessing the size of influence of leadership attributes on leadership strategies. A pattern emerged when evaluating the standardized beta weights or "size of influence" (Vogt, p. 27). Inspection of the beta coefficients (Table 14) revealed that the independent variable, priority, was the most significant in each case. The relative contribution of the independent variable priority was significantly higher than that of either knowledge or value. In the first model, an examination of the beta weights showed that the influence of priority was three times greater than the influence of value. In the second model, the influence of priority was 13 times greater than the influence of value. In the third model, the influence for priority was six times greater than value and two and a half times greater than knowledge.

In the fourth model, the influence of priority was nearly four times greater than both value and knowledge.

Therefore, the greatest predictor of leadership strategies was first, the extent that ES was viewed as a priority, followed by perceived level of superintendent knowledge. It was noteworthy that while the extent that superintendents reported ES as a value was rated very high (M=3.2) by superintendents, it did not have a significant influence over these particular leadership behaviors. The results of this multiple regression analysis underscore the importance of holding ES as a priority as it was a strong predictor of the extent that superintendents engaged their districts in leadership strategies that support a transition to ES.

Superintendent Leadership and the Relationship Between Leadership Strategies and Leadership Actions

The fourth research question assessed the relationships between leadership strategies and leadership actions within the context of ES. It was important for the researcher to investigate the presence of a leadership framework to establish the relationships among the "who," or the attributes, the "how," or the strategies, and the "what," or the actions of leadership. As with Research Question 3, the statistical tests used for addressing this question included Pearson product-moment correlation, chi square and multiple regression analysis to examine the patterns, magnitude and statistical significance of relationships among the variables.

Relationships and patterns between leadership strategies and actions. Correlations were used to determine the strength of the relationships between leadership strategies and leadership actions, and to see if any of the relationships were statistically significant.

111

Table 15

Pearson Correlations Between Leadership Strategies and Actions

	Strategies								Actions					
	Decisions	Vision	Struc-tures	Goals	Remin-ders	Indiv Bldgs	Using Data	O&M Training	HVAC	Bldg Env	Electri-cal	Energy Audit	Retro-fit	Print-ing
Strategies														
Decisions	1													
Vision	.564**	1												
Structures	.578**.	.702 **	1											
Goals	.354**	.337**	.429**	1										
Reminders Signs and Training	.439**	.548**	.438**	.436	1									
Measure Energy of Individual Bldgs	.273**	.240*	.453**	.390**	.269	1								
Using Data	.292**	.218*	.439**	.427**	239*	.871**	1							
O&M Staff Trained	.205*	.186*	.267**	.279**	.110	.501**	.554	1						
	Decisions	Vision	Struc-tures	Goals	Remin-ders	Indiv Bldgs	Using Data	O&M training	HVAC	Bldg Env	Electri-cal	Energy Audit	Retro-fit	Print-ing
Actions														
HVAC Upgrades	.189	.206*	.205*	249**	.248**	.300**	.276**	.274**	1					
Building Envelope Upgrades	.139	.199*	.268**	.215*	.099	.407**	.403**	.430**	.516**	1				
Electrical Upgrades	.237	260**	.218*	.349**	270**	358**	.330**	.357**	.566**	.564**	1			
Implement Recom-mendations of audit	.340**	.319**	.325**	.505**	258**	.427**	499**	.498**	.314**	.474**	.353**	1		
Retrofitting of Bldgs	.153	.223*	.186*	.237*	.147	.350**	.313**	.474**	.551**	.550**	.579**	.470**	1	
Minimize Printing	.352**	.389**	378**	353**	.421**	.330**	.323**	.202*	.182	.135	.204*	.336**	.211*	1

* Correlation is significant at the .05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

The correlation matrix in Table 15 illustrates the most significant relationships out of all

the leadership strategies and actions that were utilized in the survey.

The researcher applied Davis' (1971) descriptors (negligible = .00 to .09; low =.10 to .29; moderate = .30 to .49; substantial =.50 to .69; very strong = .70 to 1.00) to the correlation coefficients to determine which relationships were the most practically significant. In addition to Pearson product-moment correlations, the researcher used chi square and cross tabulations to examine the pattern of responses. The leadership strategies and action variables presented in Table 15 include only those relationships where statistical significance was shown. The variables that demonstrated a strong relationship with leadership attributes: taking ES into consideration when making district decisions, establishing a compelling need for students and staff to engage in ES, altering the district's vision and mission by establishing guiding principles and aligning structures, policies and procedures to support ES were weakly associated with leadership actions. Therefore, few of the leadership strategies that demonstrated a strong relationship with attributes also had a strong relationship with leadership actions.

Overall, the connection between leadership strategies and leadership actions was weak. The strongest area was with those variables that supported the energy efficiency of buildings, the most tangible of leadership actions relating to ES.

Implementing the recommendations from an energy audit. There were several relationships among leadership strategies that showed a moderate to substantial relationship with leadership actions. Most notably, the action implementing the recommendations from a most recent energy audit, demonstrated the greatest overall number of significant relationships as shown in Table 15. The data suggested a substantial relationship (r=.505, p<.01) between implementing recommendations from an energy audit and the extent that a district has clearly defined energy performance

113

objectives, goals, strategies and expected outcomes. A chi square analysis was also applied to the relationship (chi square=54.420, p<.001) which showed that of those superintendents who have fully defined the energy performance objectives, goals, strategies and expected outcomes for their districts, 68% of them indicated having fully implemented the energy efficiency recommendations from the most recent energy audit.

There was a moderate relationship (r=.499, p<.01) between the extent that superintendents indicated their districts have implemented the recommendations from a recent energy audit and making energy decisions based on the collection, analysis or benchmarking of data. Of those superintendents who indicated that their districts have fully implemented the energy efficiency recommendations from the most recent energy audit, 79% also reported that their districts fully make energy decisions based on the collection, analysis or benchmarking of data (chi square=51.183, p<.001).

There was a moderate relationship (r=.498, p<.01) between the extent that superintendents reported that their districts have implemented the recommendations from a recent energy audit and the extent superintendents indicated that operations and maintenance staff have been trained to service and maintain the equipment to maximize the energy efficiency. Of those superintendents who indicated that their districts have fully implemented the energy efficiency recommendations from the most recent energy audit, 63% reported that their district's operations and maintenance staff were fully trained to service and operate the equipment to maximize energy efficiency (chi square=48.452, p<.001).

There was a moderate relationship (r=.470, p<.01) between the extent a superintendent reported that his or her district has implemented the energy efficiency

recommendations from a recent energy audit and the extent the superintendent reported that district buildings were retrofitted. Of the superintendents reporting that their districts have substantially implemented the energy efficiency recommendations from the most recent energy audit, 71% also reported that their district's buildings have been mostly retrofitted (chi square=103.979, p<.001). Conversely, 75% of those superintendents who reported that their districts have not at all implemented the energy recommendations from their most recent energy audit also reported that none of their district's buildings have been retrofitted. While not statistically significant, it was interesting to note that 91% of those superintendents who reported that the buildings in their districts have been fully retrofitted also reported that their districts fully measure the energy efficiency of individual buildings.

There was a moderate relationship (r=.427, p<.01) between the extent a superintendent reported that his or her district has implemented the energy efficiency recommendations from a recent energy audit and the extent that a superintendent reported measuring the energy efficiency of individual buildings. Of those superintendents who reported that their districts have fully implemented the energy efficiency recommendations from the most recent energy audit, 74% also reported that their districts fully measure the energy efficiency of individual buildings (chi square= 40.660, p<.001).

Making energy decisions based on the collection, analysis or benchmarking of data. There was a moderate relationship (r=.403, p<.01) between making energy decisions based on the collection, analysis or benchmarking of data and the extent that upgrades to the building envelope were reported. Of those superintendents who reported

that their districts have fully upgraded the building envelope, 65% also indicated that their districts fully make energy decisions based on the data (chi square=58.352, p<.001).

There were a number of strong relationships that indicated a significant association between a several leadership strategies in support of leadership actions. This suggests that if superintendents reported using one of the strategies, they also reported using the other one as well. A very strong relationship (r=.871, p<.01) occurred between measuring the energy efficiency of individual buildings and making energy decisions based on the collection, analysis, or benchmarking of data. This was the strongest relationship between two variables in the entire study.   The greater the indication of using data to make energy decisions, the greater the likelihood of measuring the energy efficiency of individual buildings (chi square=282.269, p<.001). Of those superintendents who responded that their districts fully make energy decisions based on the collection, analysis or benchmarking of data, 95% also reported that their districts fully measure the energy efficiency of individual buildings.

A substantial relationship (r=.554, p<.01) existed between the two leadership strategies of using data to make energy decisions based on the collection, analysis or benchmarking of data and the training of O&M staff. Of those superintendents who reported that their operations and maintenance staff were fully trained to operate, service and maintain the equipment to maximize energy efficiency, 69% also stated that their districts fully make energy decisions based on the collection, analysis or benchmarking of data (chi square=50.570, p.<.001).

Measuring the energy efficiency of individual buildings. A moderate relationship was present between (r=.501, p<.01) measuring the energy efficiency of individual

buildings and upgrades to the building envelope. Of those superintendents who reported

that the building envelopes in their districts have been fully upgraded, 77% also reported

that that their districts fully measure the energy efficiency of individual buildings (chi

square=56.992, p<.001).

A moderate relationship (r=.407, p<.01) appeared between the two leadership

strategies of measuring the energy efficiency of individual buildings and the extent that

superintendents reported that their district's O&M staff have been trained. Of those

superintendents who reported that their districts fully train the O&M staff to operate,

service and maintain the equipment to maximize energy efficiency, 69% also reported

that their districts fully measure the energy efficiency of individual buildings (chi square=

41.123, p<.001).

Upgrades to electrical, building envelope, and heating, cooling and air conditioning

(HVAC). According to Table 15, there were numerous substantial relationships between

leadership actions that supported the upgrading of district facilities. This suggests that if

superintendents make upgrades to their district facilities in one area, they were also likely

to make upgrades to another area as well.

A substantial relationship (r=.551, p<.01) was present between HVAC and retrofitting

existing buildings. There was a substantial relationship between retrofitting of buildings

and upgrades to the district HVAC system. Of those superintendents who reported that

their district buildings have been fully retrofitted, 82% also indicated that their district's

HVAC systems have been fully upgraded (chi square=57.866, p<.001).

A substantial relationship (r=.550, p<.01) was present between upgrades to the

building envelope and the retrofitting of existing buildings. Of those superintendents who

reported that their districts have fully upgraded the building envelope, more than half of them also reported that their districts have fully retrofitted their buildings (chi square=60.995, p<.001).

There was a substantial relationship (r=.516, p<.01) between upgrades to the building envelope and the extent that the HVAC was also upgraded. Of those superintendents who reported that their district's building envelopes were fully upgraded, 65% of them also reported that their districts have fully upgraded their HVAC systems (chi square=56.924, p<.001).

There was a substantial relationship (r=.579, p<.01), between the extent that electrical upgrades have been made to include high efficiency lighting, controls and occupancy sensors and the extent that buildings have been retrofitted. Of those superintendents reporting that their districts have fully retrofitted their buildings, 90% also reported that their districts have also fully upgraded the electrical (chi square=57.252, p<.001).

There was a substantial relationship (r=.566, p<.01), between electrical upgrades and upgrades to the HVAC. Of those superintendents who reported that their districts have fully upgraded the electrical, 75% also reported that they have fully upgraded the HVAC as well (chi square=63.766, p<.001).

There was a substantial relationship (r=.564, p<.01) between electrical upgrades and upgrades to the building envelope. Of those superintendents who reported that their districts have fully upgraded the electrical, 71% also reported that their districts have fully upgraded the building envelope (chi square=110.842, p<.001).

Predicting leadership strategies through leadership attributes. Using multiple regression analysis, the researcher further explored the most significant relationships from the Pearson product-moment correlations to gain greater insight on the relationships between the leadership strategy and leadership action variables. The researcher selected the most significant leadership strategies from the Pearson product-moment correlations and used them in a multiple regression model to test the size of their influence on leadership actions. The leadership strategy of making energy decisions based on the collection, analysis or benchmarking of data did not contribute to the multiple regression equation and, therefore, was eliminated. Leadership actions from the entire survey were tested in this multiple regression analysis and only the four most significant dependent variables are presented in Table 16. While these results were not as consistent or as strong as the multiple regression equation from Research Question 3, they are still important to report. The combination of these three independent variables provided the ability to predict the dependent variables as the ANOVA was significant in each case ($p < .001$).

The results of the multiple linear regression model suggest that a significant proportion of the total variation of implementing the energy efficiency recommendations from an energy audit was contributed by leadership strategies ($F = 22.16$, $p < .001$). The multiple correlation coefficient ($R = .63$) indicated that approximately 38% of the variance can be accounted for by the combination of leadership strategies.

Table 16

Results of Four Multiple Regression Models: Leadership Strategies With Actions

Implementing the energy efficiency recommendations from energy audit (ANOVA: F=22.16, p<.001, R=.626, R Square=.392, Adjusted R Square= .375)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	.849	.268		3.175	.002
Clearly defined energy performance objectives, goals, strategies and expected outcomes	.297	.070	.360	4.223	.000
Measure the energy efficiency of individual buildings	.076	.079	.092	.956	.341
O & M staff trained to operate, service and maintain the equipment to maximize energy efficiency	.358	.092	.350	3.879	.000

Retrofitting of buildings (ANOVA: F=11.668, p<.001, R=.495, R Square=.245, Adjusted R Square= .224)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	1.162	.262		4.431	.000
Clearly defined energy performance objectives, goals, strategies and expected outcomes	.055	.069	.073	.798	.426
Measure energy efficiency of individual buildings	.086	.074	.118	1.157	.250
O & M staff trained to operate, service and maintain the equipment to maximize energy efficiency	.366	.091	.395	4.046	.000

Upgrading building envelope to include windows, exterior doors and roofs (ANOVA: F=11.11, p<.001, R=.484, R Square=.234, Adjusted R Square= .213)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	1.226	.248		2.242	.000
Clearly defined energy performance objectives, goals, strategies and expected outcomes	.038	.076	.047	.517	.606
Measure energy efficiency of individual buildings	.182	.082	.226	2.222	.028
O & M staff trained to operate, service and maintain the equipment to maximize energy efficiency	.312	.099	.307	3.152	.002

Upgrading electrical to high efficiency lighting, controls and occupancy sensors (ANOVA: F=9.96, p<.001, R=.464, R Square=.215, Adjusted R Square= .194)					
	Unstandardized Coefficients B		Standardized Coefficients Beta	t	Sig.
	β	Std. Error			
(Constant)	1.445	.294		4.908	.000
Clearly defined energy performance objectives, goals, strategies and expected outcomes	.193	.078	.231	2.491	.014
Measure energy efficiency of individual buildings	.133	.083	.164	1.590	.115
O & M staff trained to operate, service and maintain the equipment to maximize energy efficiency	.214	.101	.210	2.124	.036

The results of the multiple linear regression model suggest that a significant proportion of the total variation of retrofitting buildings was contributed by leadership strategies (F=11.67, p<.001). The multiple correlation coefficient (R=.49) indicated that approximately 22% of the variance can be accounted for by the combination of leadership strategies.

The results of the multiple linear regression model suggest that a significant proportion of the total variation of upgrading the building envelope to include windows, exterior doors and roofs was contributed by leadership strategies (F=11.11, p<.001). The multiple correlation coefficient (R=.48) indicated that approximately 21% of the variance can be accounted for by the combination of leadership strategies.

The results of the multiple linear regression model suggest that a significant proportion of the total variation of upgrading the building electrical to high efficiency lighting, controls and occupancy sensors was contributed by leadership strategies (F=9.96, p<.001). The multiple correlation coefficient (R=.46) indicated that approximately 19% of the variance can be accounted for by the combination of leadership strategies.

A pattern emerged when evaluating the standardized beta weights or "size of influence" (Vogt, p. 27). Inspection of the beta coefficients (Table 15) revealed that the independent variable, operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency was the most significant in two models and a close second in the other two models.

The relative contribution of the independent variable operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy

efficiency was greater than the variable of having clearly defined energy performance objectives, goals, strategies and expected outcomes or measuring the energy efficiency of individual buildings.

In the first model, an examination of the beta weights show that the influence of operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency was slightly lower than having clearly defined energy performance objectives, goals, strategies and expected outcomes. In the second model, an examination of the beta weights show that the influence of operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency was roughly four times greater than the other two independent variables. In the third model, an examination of the beta weights show that the influence of operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency was five times greater than having clearly defined energy performance objectives, goals, strategies and expected outcomes. In the fourth model, an examination of the beta weights show that the influence of operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency was slightly lower than having clearly defined energy performance objectives, goals, strategies and expected outcomes. Therefore, the greatest predictor of leadership actions was first, the extent that operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency, followed by having clearly defined energy performance objectives, goals, strategies and expected outcomes.

Investigation of Relationships Among Sample Characteristics and Leadership

Attributes, Strategies and Actions

The fifth research question investigated the impact of demographics on leadership attributes, strategies and actions. The researcher examined the relationships between the demographic variables (superintendent years in current district, district type, district enrollment, Free and Reduced Lunch rate) and leadership attributes, strategies and actions that support environmental sustainability. While there was only one identified statistically significant relationship through the application of a chi square analysis, there were a number of cross tabulation statistics worth noting that helped to extend the information regarding superintendent leadership and environmental sustainability in public schools in New York State.

Years as the superintendent of current district. While the chi square that compared years as a superintendent in current district and priority of ES was not statistically significant, it was interesting to note that 53% of superintendents who responded that ES was a high priority were those superintendents with 4-6 years in their current districts.   It was also more of a value for superintendents with 4-6 years in their current districts as indicated by 59% of them. It was also noteworthy that 50% of the superintendents who reported they were very knowledgeable of environmental sustainability had 1-3 years of experience in their current school district.

In another chi square comparison, years in current district was crossed with establishing a compelling need for environmental sustainability. The resulting chi square was not statistically significant. However, 63% of those superintendents who indicated they were highly involved in establishing a compelling need were those superintendents

123

who identified themselves as serving 4-6 years in their current district. This represents superintendents in their second contracts.

When comparing the chi square relationship between years as a superintendent in their current district to the extent that a superintendent has altered the district's vision and mission, it was determined to be not significantly significant. However, 67% of those superintendents who reported that they had not at all altered their district's vision and mission by establishing guiding principles for ES were in their first contracts as superintendents with only 1-3 years in the current district.

Of those superintendents with 4-6 years in their current district, 68% reported their districts all the time recycled, paper, cardboard, glass, plastic and metal. Of those superintendents with 7-10 years in their current district, 91% reported their districts all the time recycled obsolete technology, equipment and furniture.

While the chi square that compared years in current district to community values as a factor in helping the district become more engaged in environmental sustainability was not statistically significant, of interest was that 60% of those superintendents who reported that community values were very helpful indicated serving as the superintendent for 4-6 years. This suggests a positive relationship between the superintendent and the community in the superintendent's second contract.

There was only one significant relationship identified between the survey variables and demographics. Years in current district and the use of integrated pest management was significant (chi-square=30.125, p<.001). The longer the superintendent has served in the district, the more likely the superintendent reported using integrated pest management (IPM) in his or her district. This could suggest that

these superintendents were more knowledgeable of New York State Education

Department's regulations regarding IPM.

District type. A profile emerged regarding the characteristics of the rural

superintendent. For those superintendents who indicated that ES was a high value for

them, 60% of them reported that they were from rural school districts. Of those

superintendents who indicated that they were very knowledgeable about ES, 64% of them

also reported being from rural school districts. Of those superintendents who reported

that ES was a high priority for them, 53% were from rural schools. The topic of ES was

more of a high value and high priority for rural superintendents who also judged

themselves as being very knowledgeable of the subject. These characteristics could

possibly explain why the sample included an overrepresentation of rural superintendents.

Rural superintendents were also more likely to report that their districts measure the

energy efficiency of individual buildings (58%), and that their district buildings were

fully retrofitted (82%). Half of all suburban superintendents reported making energy

decisions based on data and suburban superintendents were more likely to report having

three or more established partnerships (43%).

Rural superintendents (6%) were the only ones who reported to be fully using

renewable sources of energy, while a third of all suburban superintendents (34%)

reported they were partially using renewable energy sources.

The data also paints a picture of the efforts of the rural superintendent and the

reduction of waste, where 86% of those superintendents reporting that their districts all

the time compost food leftovers were from rural schools. Of those superintendents

reporting that their districts all the time minimize the use of non-recyclable disposable

food containers, 92% were from rural schools. Of those superintendents reporting that their districts all the time recycle paper, cardboard, glass, plastic and metal, 63% also reported that they were from rural school districts. Of those superintendents reporting that they routinely minimize the printing and usage of paper, 67% also reported they were from rural school districts. Conversely, rural superintendents (67%) also reported that ES is minimally integrated into the curriculum or through the presence of student clubs (71%).

District size. While the chi square comparison was not statistically significant between enrollment and whether there was a district energy policy, it was notable that 80% of superintendents of school districts with enrollments of less than 750 students reported that their districts do not have an energy policy in place.

The larger the district, the greater that community values were seen as helpful in influencing the district to become more engaged in environmental sustainability. Most of the superintendents (73%) from the largest districts (3001+) indicated that community values were helpful to very helpful in having the district become more engaged in ES.

Free and reduced lunch. The chi square relationship of Free and Reduced Lunch and establishing a compelling need for environmental sustainability was determined not to be statistically significant. However, no superintendents from the highest poverty school districts (76-100%) indicated that they were involved or highly involved in establishing a compelling need, while 57% of those superintendents indicating they were highly involved in establishing a compelling need were from districts at the lowest level of the Free and Reduced Lunch (0-25%) rate category.

The chi square analysis was not statistically significant between Free and Reduced Lunch and the extent a district has clearly defined energy performance objectives, goals, strategies and expected outcomes. However, it was notable that 60% of the superintendents who reported they have fully defined energy performance objectives, goals, strategies and expected outcomes were from districts in the lowest range of Free and Reduced Lunch (0-25%).

Of those superintendents representing districts with Free and Reduced Lunch rates between 0-25%, all reported that their districts fully use data to make energy decisions. Superintendents representing districts in the 26-50% Free and Reduced Lunch category were more likely (60%) to have mostly to fully retrofitted buildings, while superintendents representing districts from the highest Free and Reduced Lunch category indicated that their district buildings have not at all been retrofitted.

While the chi square comparison between Free and Reduced Lunch and the extent a superintendent identified his district as having established partnerships with adjacent school districts and/or municipalities was not statistically significant, it was notable that superintendents representing those poorest districts (76-100% Free and Reduced Lunch) reported no established partnerships, while 42% of those superintendents from districts with the largest enrollments (3001+) reported having 3 or more partnerships.

While the chi square comparison between community values and Free and Reduced Lunch was not statistically significant, the data showed that the lower the Free and Reduced Lunch rate, the more likely the superintendent indicated that community values were helpful in having the district engage in ES. Of those superintendents who indicated

127

a low Free and Reduced lunch rate (0-25%), 63% also cited community values as being very helpful.

While the comparison between district culture and Free and Reduced lunch was not statistically significant, it was notable that 55% of those superintendents who reported that district culture was very helpful also indicated a low free and Reduced Lunch rate (0-25%). Likewise, no superintendent from the highest rate of free and reduced lunch (76-100%) indicated that district culture was helpful or very helpful.

Summary. The statistical methods and analyses applied to the data were selected so that each built progressively upon the other, adding to the overall understanding of the extent that superintendents have led their school districts in environmental sustainability efforts. Descriptive statistics were used primarily to investigate Research Questions 1 and 2. Pearson product-moment correlations, chi square analysis, cross tabulations and multiple regression analysis were applied to Research Questions 3 and 4 to examine magnitude, patterns and statistical significance of the relationships between the variables. Chi square and cross tabulations were applied to Research Question 5 to gain greater insight into the relationships between demographic data and leadership attributes, strategies and actions. The conclusions and recommendations based on this analysis will be developed and presented in Chapter V.

CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the quantitative findings from Chapter IV and presents the major conclusions from this study. Implications for system level leadership and policymakers in public education will be integrated into the recommendations. Recommendations for future areas of study will also be proposed.

Purpose of the Study and Research Questions

This quantitative study was designed to investigate superintendent perceptions of environmental sustainability and the extent to which New York State public school superintendents believe they have led their districts in integrating environmental sustainability into district structures, operations and practices. This exploratory study investigated superintendent self-reported participation in leadership strategies and leadership actions that support environmental sustainability as well as the influence of a superintendent's knowledge, value and priority of environmental sustainability. The Wheel of Change Toward Sustainability Model, developed by Doppelt (2003, 2010), was used as the lens to assess the extent to which superintendents believe they have incorporated environmental sustainability into district structures, policies, and practices. Theories of adaptive leadership (Bennis, 2007, 2008; Heifetz, 1994; Heifetz, Grashow, & Linsky, 2009; Scharmer, 2007; Scharmer & Kaufer, 2013), systems thinking (Satterwhite, 2010; Senge, 2001, 2008) pro-environmental behavior (Ajzen & Fishbein, 1980; Blake, 1999; Kollmuss & Agyman, 2002; Leiserowitz, Kates, Parris, 2006) and environmental sustainability (Dunphy, Griffiths, & Benn, 2007; Esty & Winston, 2009; Goodland, 1995; Hawken, Lovins & Lovins, 2010). Judkoff, 2012; McDonough & Braungart, 2002; Morelli, 2011; Senge et al., 2008; Spoolman & Miller, 2009; U.S.

Department of Energy, n.d.; U.S. Environmental Protection Agency, 2011; Wackernagel and Rees, 1996) were also applied to this study.

This study was designed to address the following questions regarding superintendent leadership and environmental sustainability in New York State public schools.

1. How do superintendents in New York State view environmental sustainability?

2. To what extent do superintendents believe they have applied leadership strategies, leadership actions, and accessed available resources in support of environmental sustainability?

3. What is the relationship between leadership attributes (knowledge, value and priority of environmental sustainability) and leadership strategies within the context of environmental sustainability?

4. What is the relationship between leadership strategies and leadership actions within the context of environmental sustainability?

5. What is the impact of demographics on leadership attributes, strategies and actions?

Summary of Findings and Conclusions

The framework for this study is based on the following elements of leadership for the purposes of advancing environmental sustainability: the attributes the leader possesses determine which leadership strategies he or she will employ. These strategies provide the framework, which then guide the leader into consistent action. Resources can either hinder or facilitate a positive outcome depending upon whether or not those resources are available or if a superintendent possesses the knowledge on how to access

those resources effectively. When trying to make sense of the findings and how the data fit together, the researcher concluded that leadership capacity would be a more appropriate term to use than leadership attributes. While leadership attributes have more to do with the individual traits of a leader, which were examined by assessing knowledge, value and priority of ES, leadership capacity conveys a collective sense of these three variables and will be used in Chapter V.

The data are presented and organized according to these four domains– leadership capacity, leadership strategies, leadership actions, and accessing available resources to support ES. As depicted in Figure 1, leadership for ES is equal to the sum of leadership capacity, leadership strategies, and leadership actions, all dependent upon resources that are accessed and that are available. A visual representation of the conceptual map for this study is presented below.

Figure 1: Study's Conceptual Map of Leadership For Environmental Sustainability
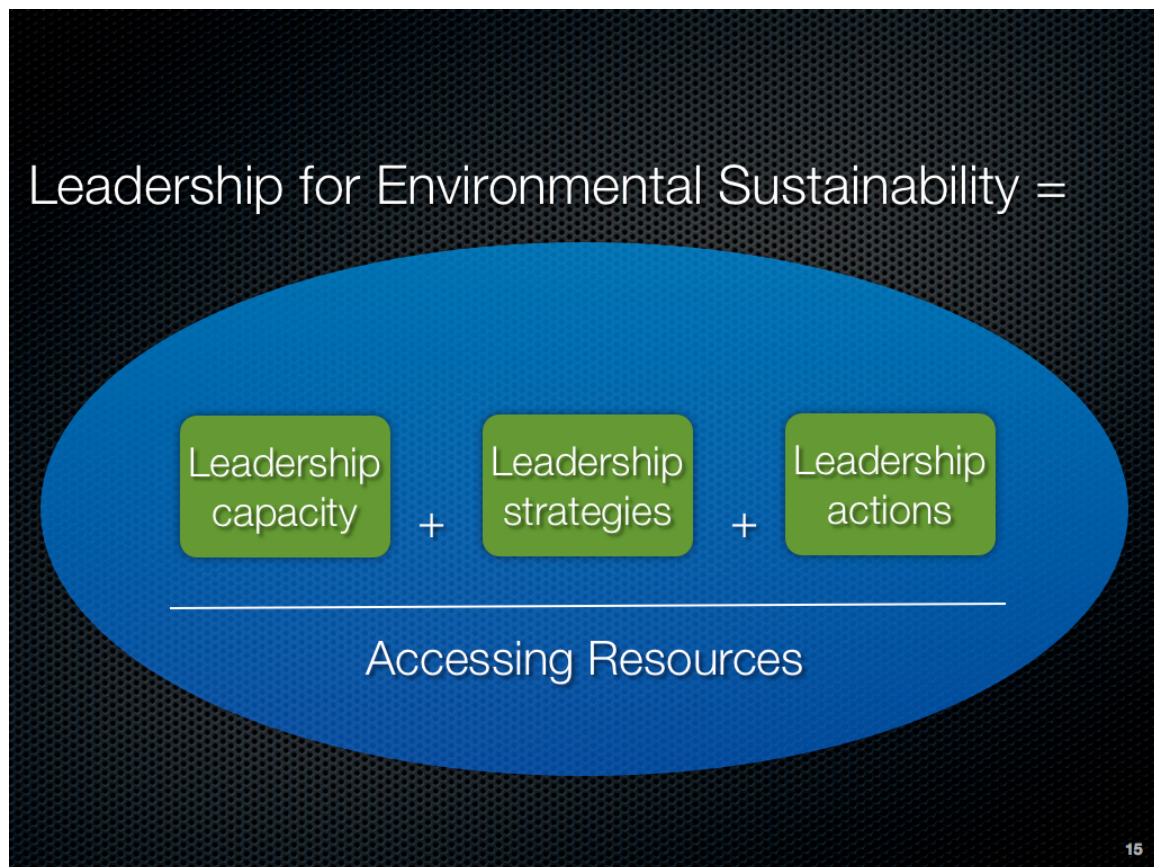
Conclusions and recommendations presented in this chapter will help to inform school district leaders on environmental sustainability in public school districts in New York State and the extent that leadership capacity, leadership strategies, leadership actions and accessing resources are contributing components to the advancement of ES. This research has significant implications for both system level leadership and policy makers in New York State.

Leadership capacity. This study focused on three leadership attributes – superintendent reported knowledge of ES, the extent that ES was cited as a value, and the

extent ES was considered a priority for superintendents. Attributes are defined as abstract ideals that direct one's goals and frame what one considers to be important (Leiserowitz, Kates, Parris, 2006). Kollmus and Agyeman (2002) identify the central components of attributes as those internal factors such as motivation, knowledge, value, responsibilities and priorities, which lead to pro-environmental behavior. When applied to leadership and to this study's conclusions, these attributes together formulated a collective sense of what it takes to lead an organization in the transformation toward environmental sustainability and will therefore be referred to as leadership capacity.

The data revealed that most superintendents do not perceive themselves to be highly knowledgeable about ES, and roughly half reported a low level of knowledge. Self-reported knowledge of ES was the lowest mean score of all three of the leadership attributes, indicating that superintendents considered knowledge to be their weakest attribute. Environmental sustainability was reported to be highly valued by 42% of the superintendents and produced one of the highest mean scores in the entire survey indicating that environmental sustainability was strongly valued by these superintendents. However, this high level of valuing did not carry over to priority where only 15% of the superintendents indicated that ES was a high priority for them. The overall difference in the high response category indicated a discrepancy between superintendent self-reported value and priority of ES suggesting that while superintendents highly value ES, they do not consider it a priority. The data also revealed a very strong relationship between value and priority and that all of the superintendents who cited ES as a high priority, also cited it as a high value. While knowledge was moderately correlated with priority, the data showed that the greater ES was cited as a priority, the more likely a superintendent was to view him or herself as more knowledgeable of ES.

A multiple regression analysis showed that the relative contribution of the independent variable, priority, was significantly higher than that of either knowledge or value. Therefore, the greatest predictor of whether or not a superintendent applied leadership strategies to district structure, policies and practices was first, the extent that ES was viewed as a priority, followed by perceived level of superintendent knowledge.

The multiple regression model of knowledge, value and priority suggested that those superintendents who demonstrated the leadership capacity to move ES forward were more likely to integrate the following leadership strategies into their school districts: taking ES into consideration when making district decisions, establishing a compelling need for students and staff to engage in ES, altering the district's vision and mission by establishing guiding principles for ES, and aligning structures, policies and procedures to support ES. These four leadership strategies are essential elements of Doppelt's (2010) Wheel of Change Toward Sustainability Model and the data suggested that those superintendents with the greatest leadership capacity have integrated these strategies into their district structures, policies, and practices.

It was noteworthy that while value was rated very highly by superintendents, it did not have a significant influence over leadership behaviors. The data suggest that just having ES as a value was not enough to get superintendents to lead their districts in strategies that support ES. The researcher concluded that the leadership attribute priority was the key driver for the strategies required to lead ES. Without being indicated as a high priority for superintendents, the strategies required to put ES into motion were less likely to be cited by superintendents. The results of these data analyses underscore the importance of holding ES as a priority as it was a strong predictor of the extent that

superintendents engaged their districts in leadership strategies that support a transition to ES.

When examining the data, a profile emerged regarding the characteristics of the rural superintendent and their self-perceptions of their leadership capacity related to ES. For those superintendents who indicated that environmental sustainability was a high value for them, 60% of them reported that they were from rural school districts. In addition, for those superintendents who indicated that they were very knowledgeable about issues of environmental sustainability, 64% of them also reported being from rural school districts. Environmental sustainability was more highly valued by rural superintendents who also judged themselves to be very knowledgeable of the subject. Lastly, rural superintendents were more than twice as likely to cite ES as a high priority than either suburban or urban superintendents. If knowledge, valuing and declaring ES as a priority are the basic elements of ES leadership capacity, then the rural superintendents from this study may be better positioned to provide leadership in ES. Based on these data, rural superintendents report that they possess a greater capacity to lead ES forward, more so than their suburban and urban counterparts.   One explanation could be that the size of most rural school districts requires these superintendents to learn about practices that support ES instead of delegating these responsibilities to other district personnel. In addition, since ES was more of a value for rural superintendents, they may have been more interested in participating in the survey, which could possibly explain why the sample included an overrepresentation of superintendents from rural school districts.

Another demographic variable provided notable information regarding leadership attributes and superintendent years in district. While the distribution of superintendents

who identified themselves as having served 4-6 years in their current district represented 32% of the total superintendent sample, it was noteworthy that these superintendents were twice as likely to indicate ES as a high priority. This suggests that once a superintendent has addressed the most pressing issues during his first three years, he or she will then be able to focus on other urgent matters, underscoring the importance of superintendent longevity within a district.

Leadership strategies. Leadership strategies refer to the organizational framework including mission, vision, objectives, goals, procedures and outcomes that provide the blueprint from which the organization operates. Overall, this framework, or the "how" of leadership, was missing to guide district decisions and actions that support environmental sustainability.

Inspiring others to engage in ES was reportedly low. Less than half of the superintendents indicated being personally involved in establishing a compelling need for students and staff to engage in ES, and roughly half stated that their use of reinforcing and rewarding behavior to support ES was limited. In addition, the use of incentives, as a way to encourage participation in conservation behaviors, was extremely low with 45% indicating they do not use them at all. According to Doppelt (2010), the greatest leverage point, and most important thing a leader can do to facilitate the transition to ES, is to change the dominant mind-set by establishing a compelling need and by using incentives. The data revealed that the strategies of establishing a compelling need and using incentives to support this shift are weakly supported in school districts across New York State.

Another key factor in an organization's transformation to environmental sustainability is learning as change occurs in a deeply rooted process, one that entails learning and unlearning, and the use of reminders, signs and training are successful strategies to support this (Doppelt, 2010; Dunphy, Griffiths & Benn, 2007; Schein, 2010; Senge et al., 2008). However, the strategy of using reminders, signs and training to promote the conservation efforts of building occupants was weakly indicated as only 5% of superintendents reported engaging in these strategies all the time. This suggests that superintendents need to focus more attention to this area by continually reinforcing the need, purpose, strategies, and benefits of ES to ensure buy-in of building occupants. Doppelt (2010) contends that the message of ES should be reinforced and celebrated with every opportunity that leaders can take advantage of –meetings, speeches, emails, signs, reminders, trainings and organizational publications. The data showed that the more involved a superintendent was in establishing a compelling need, the more likely a superintendent was to report the use of reminders, signs and training suggesting that those superintendents who are establishing a compelling need in their school districts are utilizing these strategies that help to transform the behaviors of building occupants.

The majority of superintendents reported that they minimally encourage student learning of ES through its integration into the district curriculum or application through student clubs. This appears to be a missed opportunity as education can play a key role in raising awareness of ES and serves as an important strategy in helping students engage in life-long pro-environmental behaviors. As the urgency to transition to ES increases, education continues to be a key factor in promoting a realistic solution (Sterling, 2001, UNESCO, 1997).

Roughly three quarters of the superintendents reported that they usually take ES into consideration when making district decisions, but this was not supported by the reported presence of a district framework.   There was little evidence that superintendents utilize a systems approach as they reported to have minimally aligned the critical parameters of the organization through its structures, policies, and procedures. In addition, superintendents reported to have minimally altered their district's vision and mission by establishing guiding principles.   A key leverage point for transitioning to ES is for an organization to alter its vision, mission and guiding principles that ensure strategies and actions according to a framework that supports ES (Doppelt, 2010).   The data revealed that superintendents have minimally aligned the critical elements of their district's systems to support a shift to ES.

The majority of superintendents reported that they do not have an energy policy in place and few superintendents reported that their districts have fully defined energy performance objectives, goals, strategies and expected outcomes. Doppelt (2010) argues that aligning the critical parameters of ES throughout the organization, including all internal systems, structures, policies and procedures is critical because it ensures that everyone is moving in the same direction, as a system, rather than as a collection of separate components. It also assures that all stakeholders are working toward the same goals. Putting this "how" of leadership in place is necessary for superintendents to be able to make district decisions and pursue actions in support of ES. Again, the data revealed that superintendents have minimally aligned the critical parameters to support a transition to ES.

It was notable that superintendents serving 1-3 years in their current districts were three times more likely to have reported they have either not at all or minimally altered their district's vision and mission by establishing guiding principles that support ES. This was in sharp contrast to superintendents serving 4-6 years in their current district who were twice as likely to indicate they have substantially altered their district's vision and mission by establishing guiding principles for ES. This implies that superintendents in their first three years are less likely to make changes to the critical parameters of the organization in support of ES and that superintendent longevity matters.

Superintendents reported that they at least mostly measure the energy efficiency of individual buildings and make energy decisions based on the collection, analysis or benchmarking of data. These two variables had the strongest relationship in the entire survey. The more frequently superintendents indicated that they used data to make energy decisions, the greater the likelihood that they also reported measuring the energy efficiency of individual buildings in their districts. Of those superintendents who responded that they fully make energy decisions based on the collection, analysis or benchmarking of data, 94% also reported that their districts fully measure the energy efficiency of individual buildings. This suggests that superintendents looking to incorporate the use of energy data to make decisions should ensure that they also measure the energy efficiency of individual buildings.

Only a quarter of superintendents reported that their operations and maintenance (O&M) staff were fully trained to operate, service and maintain the equipment to maximize energy efficiency. This may be a missed opportunity as the U.S. Department of Energy's Federal Management Program (FEMP) (2010) contends that an efficiently

run operations and maintenance program in a school district can save 5-20% annually on energy bills without any significant capital investment. Superintendents may want to ensure that their O&M staff receives the proper training so that energy efficiencies and potential savings can be realized. Superintendents may also want to reconsider further cuts to the O&M budget as according to Princeton Energy Resources International (2004), O&M spending per student is at its lowest level in 30 years, causing many buildings and their equipment to be poorly maintained leading to greater energy inefficiencies. Ensuring that a district's O&M staff are fully trained are essential elements in making the transition to ES.

Leadership actions. Action, or the "what" of leadership, refers to the results of the leadership strategy. These outcomes together move an organization forward and allow it to fulfill its goals. This study asked superintendents to report on leadership actions relating to building upgrades, energy partnerships, use of renewable energy sources, energy audits, recycling, and perceived conservation behaviors of students and staff.

The data revealed low participation levels in the areas of energy partnerships and most indicated they were not at all using renewable energy sources. One area that was identified as being successful was the use of regional energy consortiums where most superintendents reported that their districts were purchasing energy through a regional energy consortium as a way of reducing the high cost. This suggests that collaboration among school districts is beginning to occur.

The majority of superintendents reported that their buildings have been mostly retrofitted. However, the participation level in the fully category was extremely low (10%). Superintendents reported making the greatest overall facility upgrades to their

district's HVAC systems, where the majority indicated they have at least mostly

upgraded heating, cooling and air conditioning to be more energy efficient. A quarter of

the superintendents reported having fully upgraded their district's electrical (high

efficiency lighting, controls and occupancy sensors), which represented the largest

percentage of responses in the fully upgraded category, while the upgrade with the lowest

response in the fully category was the building envelope (windows, exterior doors, roofs).

These results follow the recommendations of the New York Power Authority (Optimal

Energy, 2013), who reports that the greatest savings for school districts are replacements

of boilers or boiler burners in heating systems, lighting and lighting controls, and direct

digital controls.   The area with the lowest overall reported energy upgrades was to the

domestic water system, which could suggest that at this point, people in New York State

are not overly concerned about conserving water. It also appears that school districts

have different levels of involvement in building upgrades, which might suggest that

superintendents are being advised by experts differently on which upgrades may have the

biggest impact and provide for the greatest savings on district budgets.

The majority of superintendents (77%) reported that their districts perform energy

audits every five years, while few (17%) reported having fully implemented the

recommendations from their most recent energy audit.   If districts are not fully

implementing the energy efficiency recommendations from their energy audits, one must

ask, how long will it take for New York State's school buildings to ever fully be energy

efficient?   One of the most effective short-term solutions to reducing carbon emissions is

to increase building efficiency through energy retrofits (Judkoff, 2012). Experts agree

that opportunities exist for reducing energy use in school buildings by getting the most

productivity from every unit of energy through retrofits that utilize innovative materials, technologies and equipment, and more efficient lighting and insulation. This is a win-win solution; schools can reduce the impact of energy costs on district budgets while also reducing their impact on the environment.

Recycling efforts are strong as most superintendents responded that their districts at least routinely recycle a multitude of materials and items. The majority of superintendents reported that their districts always recycle obsolete technology, equipment and furniture.

The composting of food leftovers was very low with most superintendents reporting that their districts do not compost. Another area with low participation pertained to food containers where few (11%) superintendents reported that their districts always minimize the use of non-recyclable food containers. However, rural superintendents reported the greatest participation levels in these areas. These two survey questions represented the greatest number of respondents in the not sure category where it was an available option in the survey, suggesting that superintendents are less involved in making these decisions. The data suggest that composting is underutilized in school districts across New York State.

Those strategies which demonstrated a strong relationship with leadership capacity: taking ES into consideration when making district decisions, establishing a compelling need for students and staff to engage in ES, altering the district's vision and mission by establishing guiding principles for ES, and aligning structures, policies and procedures to support ES were weakly associated with leadership actions. Therefore, few of the leadership strategies that supported a framework for district decision-making in

support of ES had a strong relationship with actions. Those strategies which did have a strong relationship with actions were those that had more to do with concrete actions such as having clearly defined energy performance objectives, goals, strategies and expected outcomes, measuring the energy efficiency of buildings, and training the O&M staff to operate, service and maintain the equipment to maximize energy efficiency. This indicates that the leadership strategies that were most closely associated with the leadership attribute of priority were not closely associated with leadership actions.

Accessing resources to support environmental sustainability. The greatest barriers to transitioning to ES are structural ones because they force people to make trade-offs (Leiserowitz, Kates, Parris, 2006). Structural barriers include laws, regulations, infrastructure, available technology, social norms, as well as social, economic and political interests (Leiserowitz, Kates, Parris, 2006). All of these barriers contribute to the gap between value and action. Without a necessary infrastructure to support pro-environmental behavior, leaders will be less likely to engage their organizations in transitioning to ES. Accessing the appropriate resources is essential in making the transition to ES. Resources help to facilitate the "what" into action. This study asked superintendents questions pertaining to financial resources, human resources as they relate to district culture and community values, and available information on ES.

The data suggest that the financing of ES in school districts is a challenge for most superintendents. The majority of superintendents stated that the current state funding formula was not helpful in allowing their districts to become more engaged in ES and a quarter of them reported that funding through grants, loans, or rebates were not helpful either.   Superintendents indicated they do not believe that adequate financial resources

are available for them to pursue ES. If ES is something that needs to happen, then funding and the necessary resources to help support the shift need to become available to superintendents.
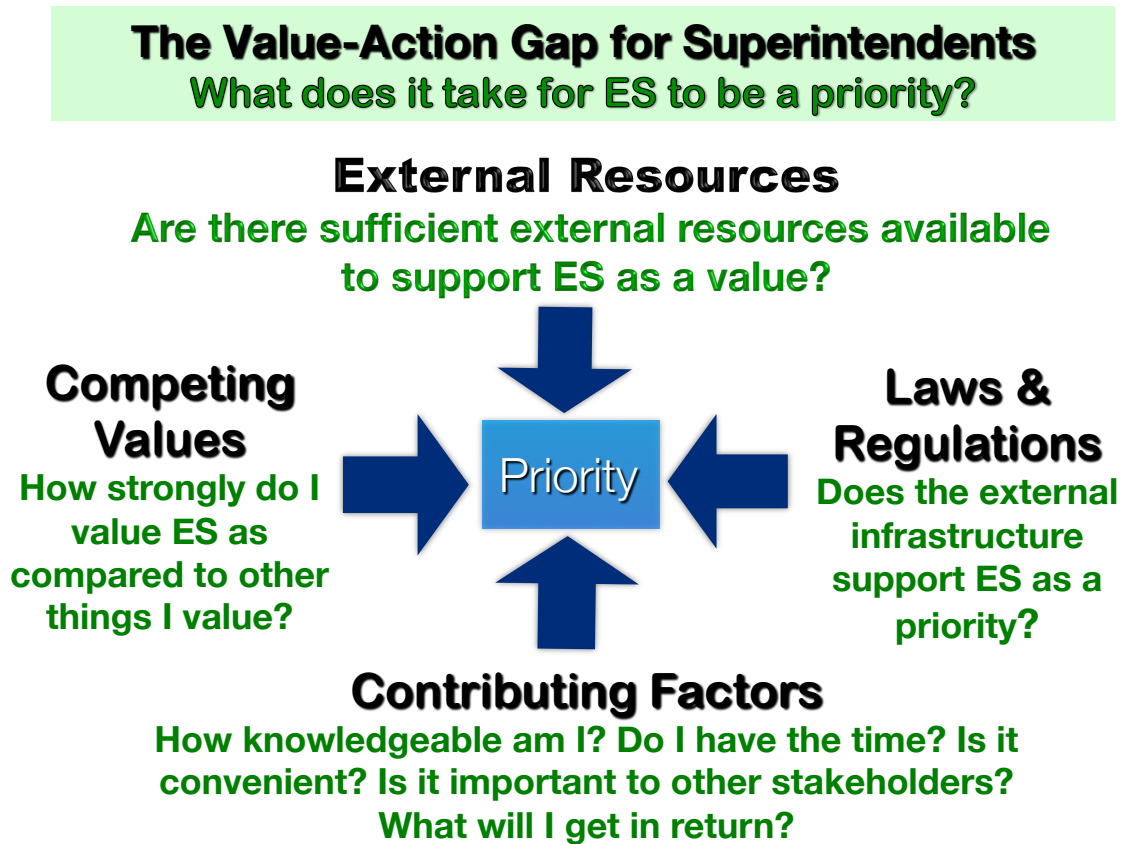
Neither district cultures nor community values are driving the push for these superintendents to lead their districts in ES efforts as few superintendents cited they were very helpful. It was notable that the majority of superintendents who cited community values as being very helpful were those superintendents who indicated serving 4-6 years in that district. This suggests that the longer a superintendent serves in a district, the more he or she is able to establish a relationship with the community for the benefit of the school district.

Recommendation

Increase the leadership capacity of superintendents.   According to the data**,** the extent that superintendents possessed leadership capacity – the collective synergy of knowledge, value and priority – had the greatest influence over whether or not superintendents utilized strategies and actions that supported ES. Therefore, the most important thing that can happen in moving public school districts forward in the transition to environmental sustainability is to increase the leadership capacity of superintendents. The data showed that superintendents who held ES as a high priority were more likely to utilize the following strategies, which according to Doppelt (2010) are essential in moving an organization forward: taking ES into consideration when making district decisions, establishing a compelling need for students and staff to engage in ES, altering the district's vision and mission by establishing guiding principles and aligning structures, policies and procedures to support ES. Since the extent that ES was cited as a priority by superintendents was the most important driver for superintendent

leadership, transition toward ES will only occur if more superintendents hold ES as more of a priority.   A visual representation of the elements that influence whether or not ES is held as a priority for superintendents is depicted in Figure 2.

Figure 2: The Value-Action Gap Dilemma For Superintendents

The Value-Action Gap for Superintendents
What does it take for ES to be a priority?

External Resources
Are there sufficient external resources available to support ES as a value?

Competing Values
How strongly do I value ES as compared to other things I value?

Priority

Laws & Regulations
Does the external infrastructure support ES as a priority?

Contributing Factors
How knowledgeable am I? Do I have the time? Is it convenient? Is it important to other stakeholders? What will I get in return?

Since the attributes of value and knowledge were strongly correlated with priority, an essential component of the value-action gap solution is to increase how strongly superintendents value ES as well as the extent that superintendents possess knowledge of ES. While nearly the majority of superintendents held ES as a high value, the data indicated that there was a substantial gap between superintendent value and the extent that superintendents viewed ES as a priority, or the value-action gap. The data revealed that all of the superintendents who indicated that ES was a high priority also indicated that it was highly valued. Therefore, strengthening the extent that ES is held as a value,

145

as compared to other things superintendents value, is critical. Since those superintendents who reported that ES was a priority were also more knowledgeable of the subject, increasing the level of knowledge that superintendents possess on ES is also an essential component of increasing leadership capacity. In addition to knowledge, there are other contributing factors that influence priority: time, convenience, the level of value that other stakeholders hold ES and motivation to participate. Therefore, any systemic change to move districts forward must be targeted to increasing the level of capacity that superintendents possess to lead environmental sustainability. The leadership capacity of superintendents can be increased through the implementation of the following methods.

By increasing superintendent knowledge of ES. Superintendent knowledge of ES needs to be fostered in three areas. First, superintendents need to understand why the transition to ES is one that needs to occur and how their school districts can benefit by making this shift. One way to increase superintendent knowledge of ES is to make training and professional development options available to superintendents. State policymakers need to establish a compelling need for environmental sustainability in public schools by reaching out to superintendents. Increasing superintendent awareness of the opportunities for cost related savings should be communicated as well so that transitioning to ES will become more of an attractive option. This recommendation is supported by the findings from NYPA who cited that lack of awareness of energy savings opportunities and their financial benefits were substantial barriers for school districts in implementing energy efficiency, conservation and renewable energy technologies (Optimal Energy, 2013).

Once superintendents understand why they should make the transition to ES, the second step is to become knowledgeable on how to implement this shift. Professional

development should include increasing superintendent knowledge of the leadership strategies and leadership actions that best support ES.   Support should be provided for superintendents on how to integrate those strategies into their district's structures, policies and practices that were significantly correlated with priority: taking ES into consideration when making district decisions, establishing a compelling need for students and staff to engage in ES, altering the district's vision and mission by establishing guiding principles, and aligning structures, policies and procedures to support ES. Superintendents also need technical assistance so that they may pursue leadership actions that support ES in the areas of energy efficiencies of buildings, which facility upgrades are most cost effective, strategies for reducing district waste, and strategies for promoting the conservation efforts of building occupants.   To help prepare aspiring superintendents as well as other system leaders, this information should also be included in leadership development programs.

Lastly, as elaborated upon below, superintendents need to know how to access resources effectively to support the transition to ES.

By increasing access to resources and funding to support ES. Superintendents need to know how to access resources that support a transition to ES. This includes working with an energy service company, an energy education company, establishing partnerships and utilizing resources that can lower district expenses related to ES. However, if the resources, or infrastructure is not available to support the transition to environmental sustainability, little progress can be made as a whole throughout New York State. There will continue to be pockets of school districts, led by those superintendents who hold ES as a high priority who continue the transition, but it will not progress at the necessary speed without greater external support. Numerous theorists have concluded that the

147

strength of values that support ES usually falls victim to other competing priorities such as an individual's time constraints, financial situation, habits and routine, knowledge, skills, power, and perceived efficacy to translate their value of the environment into action (Ajzen & Fishbein, 1980; Blake, 1999; Kollmuss & Agyman, 2002; Leiserowitz, Kates, Parris, 2006). Many of these barriers force leaders, either consciously or unconscientiously, to make trade-offs.

The data indicated a large gap between those superintendents who reported that their districts performed energy audits every five years and those who indicated that they have fully implemented the energy efficiency recommendations from their district's most recent energy audit. Superintendents reported that funding was not adequate to support a transition to ES, which suggests that districts were not able to fully implement the energy efficiency recommendations from the audit because of a lack of financial resources. Superintendents need support in accessing resources to make the needed energy efficiency upgrades in their districts. Policymakers need to reinforce an infrastructure to support ES as well as making the availability of these resources more accessible to all of New York State's superintendents.

Reported use of partnerships revealed low participation levels and as an untapped area, should be pursued by superintendents looking to reduce costs. Additionally, renewable energy sources were only reported to be fully used by 3% of superintendents, and therefore, represents an area with enormous potential.

The data indicated that human resources have not been helpful in moving districts forward in the transition to ES.   Establishing a compelling need, especially for conservation, is an essential strategy and should be used to influence district culture and

community values regarding ES. One way to do this is for the superintendent to develop multi-layered committees dedicated to ES. Each district could have building committees as well as a district-wide committee made up of representatives from each building. This could go one step further to include a community committee. At the community level, the district committee could partner with the municipality and other key stakeholders to plan and develop a community vision for the future and address a number of issues related to ES: how the community will meet the future demand for energy, how it will curb the filling of landfills in their region, how it can increase a culture of conservation in the community, and how buildings can be upgraded to be more energy efficient. These critical conversations will result in the sharing and increase of knowledge, collaboration and partnerships, and most importantly, a plan and vision to address ES, while ensuring a better future.

As superintendents indicated, they do not believe that adequate financial resources are available to them to pursue ES. In order to move forward, the current method of providing funding to schools for energy projects needs to change in order for ES to be more achievable for more school districts. Since a school renovation that incorporates high performance design can net a significant annual savings on utility costs, this is an area that should be supported more by the state government through incentives, grants and rebates. New regulations should permit school districts to accept funding to implement ES even if they are at their debt capacity. Funding could cover building upgrades, new construction, and financial incentives to also support the promotion of conservation behaviors of building occupants. In a study conducted by NYPA, the researchers concluded that lack of project funding was a barrier to the implementation of

both energy efficiency and renewable energy projects and that expenditures for energy projects lose out to other budget priorities (Optimal Energy, 2013). In order to move ES forward in New York State, policymakers need to consider making funding more accessible to school districts so superintendents can pursue ES more effectively.

Since the data revealed low participation levels of the presence of ES in district curriculums as well as their application through student clubs, funding could also be used to assist districts in establishing clubs and the integration of ES into the curriculum. Superintendents may want to ensure that environmental sustainability is present in their district's science standards as well as providing opportunities for students to apply their learning through student clubs. As education can play a key role in helping to foster changes in behavior, this is an important strategy to encourage life-long pro-environmental behaviors for the next generation of energy and resource consumers.

By encouraging superintendent longevity in the district. The data suggest that superintendents serving 4-6 years were more likely to indicate ES as a high priority. These superintendents are typically those in their second employment contracts. These superintendents were also twice as likely to indicate they had substantially altered their district's vision and mission by establishing guiding principles. If ES is something that needs to happen, then superintendent stability in a school district is a necessary component and should be encouraged by all stakeholders. Boards of Education may want to offer longer contracts to superintendents to encourage greater stability.

By providing incentives for school districts to participate in ES. Since those superintendents who cited ES as a high priority were more likely to have reported employing leadership strategies that support environmental sustainability, getting more

superintendents to hold ES as a priority is essential. Doppelt (2010) purports that incentives can be powerful tools for helping people adopt new habits and behaviors and for increasing the level that something is held as important. The data showed that the strategy of using incentives to encourage engagement in ES was at an extremely low level. By providing incentives to school districts to engage in ES, superintendents will be more likely to encourage the participation of building occupants to engage in conservation behaviors, plan for facility upgrades, reduce waste, initiate partnerships, explore renewable energy and integrate ES into district policies, practices and structures. Doppelt (2010) reports that incentives are important because they help to spur innovation. Financial incentives for school districts as well as recognition of individuals, teams and the organization as a whole, are powerful catalysts for innovation and in transitioning an organization toward environmental sustainability. The New York State Education Department's initiative of awarding efficiency grants and the federal Green Ribbon Schools program are examples of incentives and recognition opportunities for school districts. However, more opportunities for incentives are needed. Research from sociology and psychology support the use of incentives as an important tool to encourage and positively reinforce pro-environmental behavior (Kollmuss & Agyman, 2002; Leiserowitz, Kates, Parris, 2006).

Recommendations for Future Research

There are four recommendations for future research based on the findings from this study.

A significant finding from this quantitative exploratory study was that the key driver for a superintendent to incorporate leadership strategies was whether or not ES was

held as a high priority. This finding prompts further investigation through a qualitative study, which would permit for a deeper and more in-depth exploration of the leadership attributes featured in this study and how they influence leadership strategies and leadership action.   The link among knowledge, values, and priority and their relationship to leadership strategies and action should be explored by interviewing a representative sample of superintendents.   A qualitative researcher could assess and accurately clarify superintendent levels of knowledge and value of ES and determine the optimal levels required to consider ES as a high priority, leading to superintendent action in support of ES.

A future study could also carry out a more in-depth investigation as to why there appeared to be a difference in how rural superintendents responded when compared to their suburban or urban counterparts. The data from this study suggested that ES was more of a value and priority for rural superintendents. This warrants further research through a qualitative study to fully understand this relationship.

The design of this study did not reveal any strong linkages between leadership strategies and leadership actions and therefore warrants further research. A quantitative study could further investigate the connections between strategies and actions required to lead ES forward in school districts in New York State.

Lastly, this study did not include gender or age as part of the demographics and therefore, warrants further exploration. A future quantitative study could investigate the relationships between gender and age with environmental sustainability, and whether there were any significant findings.

Summary

The purpose of this study was to investigate the extent to which New York State public school superintendents believe they have led their school districts in environmental sustainability efforts. This exploratory study investigated superintendent self-reported participation in leadership strategies and leadership actions that support ES as well as the influence of a superintendent's knowledge, value, and priority of environmental sustainability.

Superintendents do not view themselves as highly knowledgeable of ES. While the majority of superintendents hold ES as a high value, the data suggested that just having ES as a value was not enough to get superintendents to lead their districts in strategies and actions that support ES. The data suggested the key driver for a superintendent to incorporate leadership strategies leading to action was whether or not ES was a high priority. The data from this study indicated that the leadership capacity for making the transition to ES is missing and that the link among knowledge, value and priority, or their collective synergy of leadership capacity, is the key to moving environmental sustainability forward in New York State. Increasing superintendent capacity to lead environmental sustainability in New York State public school districts must become a priority.

The call to leadership could not be greater for those who have the courage to do the right thing. As President John F. Kennedy said 50 years ago, "We must think and act not only for the moment but for our time" (University of California at Berkeley, 1962). After President Kennedy made this statement, he followed it up with a story. "I am reminded of the story of the great French Marshal Lyautey, who once asked his gardener

to plant a tree. The gardener objected because the tree was slow growing and of a particular species that would not reach maturity for another one hundred years. The Marshal responded, 'In that case, there is no time to lose, plant it this afternoon.'" As Kennedy implied, the seeds of greatness must be planted far in advance as it takes patience, care and a vision for the future. The longer the problems related to environmental sustainability are ignored, the more difficult they will become to solve. Superintendents are in a key position to cultivate a grass roots campaign in their communities.

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Survey for Superintendent Leadership and Environmental Sustainability in
New York State Public Schools

Background Information

This survey should take approximately 10-12 minutes to complete. Please know that you may stop at any time and that you do not have to answer any questions with which you are not comfortable. Thank you for being a part of this research.

1. How many years have you served as the superintendent of THIS school district?

2. My district is best characterized as:

○ Urban

○ Suburban

○ Rural

3. My district's 2012-2013 enrollment is:

4. My district's 2012-2013 Free and Reduced Lunch rate is:

The Role of the Superintendent in Implementing Environmental Sustainability

5. How knowledgeable are you on issues of environmental sustainability?

Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable
○	○	○	○

6. To what extent is environmental sustainability a VALUE for you?

Not a Value	Low Value	Medium Value	High Value
○	○	○	○

7. To what extent is environmental sustainability a PRIORITY for you?

Not a Priority	Low Priority	Medium Priority	High Priority
○	○	○	○

8. To what extent do you take environmental sustainability into consideration when making district decisions?

Never	Sometimes	Usually	Always
○	○	○	○

9. To what extent have you altered your district's vision and mission by establishing guiding principles for environmental sustainability?

Not at All	Minimally	Substantially	Fully
◯	◯	◯	◯

10. To what extent have you aligned structures, policies and procedures to support environmental sustainability?

Not at All	Minimally	Substantially	Fully
◯	◯	◯	◯

11. To what extent have you been PERSONALLY involved in:

	Not Involved	Limited Involvement	Involved	Highly Involved
Establishing a compelling need for students and staff to engage in environmental sustainability	◯	◯	◯	◯
Reinforcing and rewarding behavior that supports environmental sustainability	◯	◯	◯	◯

A Systems Approach to Implementing Environmental Sustainability

A systems approach includes setting goals and creating for the future through leveraging components of a larger, complex and interdependent structure (Senge, 2000).

12. Does your district have an energy policy?

◯ Yes

◯ No

13. To what extent does your district have clearly defined energy performance objectives, goals, strategies and expected outcomes?

Not at All	Partially	Mostly	Fully
◯	◯	◯	◯

14. To what extent has your district established partnerships with adjacent school districts and/or municipalities to reduce energy costs?

No Partnerships	1 Partnership	2 Partnerships	3 or More Partnerships
◯	◯	◯	◯

9. To what extent have you altered your district's vision and mission by establishing guiding principles for environmental sustainability?

Not at All	Minimally	Substantially	Fully
○	○	○	○

10. To what extent have you aligned structures, policies and procedures to support environmental sustainability?

Not at All	Minimally	Substantially	Fully
○	○	○	○

11. To what extent have you been PERSONALLY involved in:

	Not Involved	Limited Involvement	Involved	Highly Involved
Establishing a compelling need for students and staff to engage in environmental sustainability	○	○	○	○
Reinforcing and rewarding behavior that supports environmental sustainability	○	○	○	○

A Systems Approach to Implementing Environmental Sustainability

A systems approach includes setting goals and creating for the future through leveraging components of a larger, complex and interdependent structure (Senge, 2000).

12. Does your district have an energy policy?

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○ No

13. To what extent does your district have clearly defined energy performance objectives, goals, strategies and expected outcomes?

Not at All	Partially	Mostly	Fully
○	○	○	○

14. To what extent has your district established partnerships with adjacent school districts and/or municipalities to reduce energy costs?

No Partnerships	1 Partnership	2 Partnerships	3 or More Partnerships
○	○	○	○

177

15. Rate the following factors according to how much they have helped your district become more engaged in environmental sustainability.

	Not Helpful	Somewhat Helpful	Helpful	Very Helpful
Available information on sustainability	◯	◯	◯	◯
District culture	◯	◯	◯	◯
Community values	◯	◯	◯	◯
Current state funding formula	◯	◯	◯	◯
Funding through grants, loans, or rebates	◯	◯	◯	◯

16. To what extent is your district using renewable sources of energy such as solar, wind or geothermal?

Not Using	Partially Using	Mostly Using	Fully Using
◯	◯	◯	◯

17. Does your district purchase energy through a regional energy consortium?

◯ Yes

◯ No

18. To what extent has your district realized savings through a systems approach to environmental sustainability?

No Savings Realized	Minimal Savings	Moderate Savings	Substantial Savings
◯	◯	◯	◯

Engagement of Staff and Students in Energy and Water Conservation

19. To what extent do you PERSONALLY encourage staff/students' participation in conservation efforts through

	Not at All	Minimally	Routinely	All the Time
Reminders, signs and training	◯	◯	◯	◯
Incentives	◯	◯	◯	◯
Curriculum	◯	◯	◯	◯
Student Clubs	◯	◯	◯	◯

20. To what extent do you believe staff/students engage in the following behaviors:

	Never	Occasionally	Frequently	All the Time	Not Sure
Control heating and cooling	○	○	○	○	○
Reduce electrical energy (i.e. turn off lights, computers, electrical devices when not in use)	○	○	○	○	○
Reduce water consumption (i.e. turn off sinks, reduce the use of hot water, limit irrigation of playing fields)	○	○	○	○	○

21. To what extent has your district realized savings through the conservation efforts of staff and students?

No Savings Realized	Minimal Savings	Moderate Savings	Substantial Savings
○	○	○	○

Energy Efficiency of Buildings

22. To what extent does your district:

	Not at All	Partially	Mostly	Fully	Not Sure
Measure the energy efficiency of individual buildings	○	○	○	○	○
Make energy decisions based on the collection, analysis or benchmarking of data	○	○	○	○	○

23. To what extent is your operations and maintenance staff trained to operate, service and maintain the equipment to maximize energy efficiency?

Not at All	Partially Trained	Mostly Trained	Fully Trained
○	○	○	○

24. To what extent has your district retrofitted buildings to make them more energy efficient?

Not at All	Partially Retrofitted	Mostly Retrofitted	Fully Retrofitted
○	○	○	○

25. To what extent has your district made energy upgrades to the following areas:

	Not at All	Partially Upgraded	Mostly Upgraded	Fully Upgraded	Not Sure
Heating, cooling and air conditioning (i.e. boilers, uni-vents, energy management control systems)	○	○	○	○	○
Building envelope (i.e. windows, exterior doors, roofs)	○	○	○	○	○
Electrical (i.e. high efficiency lighting, controls and occupancy sensors)	○	○	○	○	○
Domestic water system (i.e. low flow fixtures, water saving devices)	○	○	○	○	○

26. Does your district perform energy audits every five years?

○ Yes

○ No

27. To what extent has your district implemented the energy efficiency recommendations from your district's most recent energy audit?

Not at All	Minimally	Substantially	Fully	N/A
○	○	○	○	○

28. To what extent has your district realized savings through energy efficiency measures?

No Savings Realized	Minimal Savings	Moderate Savings	Substantial Savings
○	○	○	○

29. To what extent are staff/students encouraged to reduce waste through:

	Not at All	Minimally	Routinely	All the Time
Reminders, signs and training	◯	◯	◯	◯
Minimizing printing and usage of paper	◯	◯	◯	◯

30. To what extent does your district recycle:

	Not at All	Minimally	Routinely	All the Time	Not Sure
Paper, cardboard, glass, plastic and metal	◯	◯	◯	◯	◯
Obsolete technology, equipment, and furniture	◯	◯	◯	◯	◯

31. To what extent do your district cafeterias:

	Not at All	Minimally	Routinely	All the Time	Not Sure
Compost food leftovers	◯	◯	◯	◯	◯
Minimize the use of non-recyclable disposable food containers (i.e. trays, milk containers)	◯	◯	◯	◯	◯

32. To what extent does your district:

	Not at All	Minimally	Routinely	All the Time	Not Sure
Purchase and use green cleaning products	◯	◯	◯	◯	◯
Use integrated pest management (i.e. limited use of pesticides)	◯	◯	◯	◯	◯

33. To what extent has your district realized savings through the reduction of waste?

No Savings Realized	Minimal Savings	Moderate Savings	Substantial Savings
◯	◯	◯	◯

Sage Graduate Schools EDUCATION HEALTH SCIENCES MANAGEMENT

School of Health Sciences Deans Office
65 1st Street
Troy, NY 12180
http://www.sage.edu/sgs---518-244-2264

February 5, 2013

Jennifer Spring
4 Westminster Road
Utica, NY 13501

IRB PROPOSAL # 33-2012-2013
Reviewer: Susan C. Cloninger, Chair

Dear Jennifer:

The Institutional Review Board has reviewed your application and has approved your project entitled "Environmental Sustainability in Public School Districts in New York State." Good luck with your research.

When you have completed collecting your data you will need to submit to the IRB Committee a final report indicating any problems you may have encountered regarding the treatment of human subjects

Please refer to your IRB Proposal number whenever corresponding with us whether by mail or in person.

Please let me know if you have any questions.

Sincerely,

Susan C. Cloninger, PhD
Chair, IRB

SCC/nan

Cc: Dr. Raymond O'Connell

APPENDIX C
Email to Superintendents

From: "Jennifer Spring"
Date:
To: Superintendents
Subject: Research Study on Environmental Sustainability Efforts of NYS Public School Districts

My name is Jennifer Spring, a doctoral candidate in the Educational Leadership program at The Sage Colleges in Albany. I am writing to invite you to participate in a research study that has been supported in part by the Raymond R. Delaney Scholarship. This study investigates the extent to which New York State public superintendents believe they have led their school districts in environmental sustainability efforts. More specifically, the study will examine sustainability according to the following areas: the role of the superintendent, evidence of a systems approach, engagement of staff and students in conservation, energy efficiency of buildings, the reduction of waste and savings realized.

The information gathered from this study will help to inform leaders – from school districts to governmental agencies - on the state of environmental sustainability in public schools in New York State and the role that superintendents are playing. It will also provide recommendations for specific practices and initiatives that should be considered by school district leaders.

The research will involve the completion of a 10-12 minute survey. The researcher will collect only self-reported data from your district and will not have access to the identity of the individual completing the survey or individual school districts. After the completion of the dissertation, the data will be destroyed. The results of the research will be reported in aggregate and may be published in a professional journal or presented at professional meetings. I would be happy to share a copy of the results with you.

Participation is voluntary. You may at any time during the survey stop or choose not to answer some questions with which you are not comfortable. If you decide to participate, that will constitute informed consent.

If you have any questions, please feel free to contact me at sprinj@sage.edu or my doctoral chairperson, Dr. Ray O'Connell at oconnr@sage.edu with any questions or concerns. You may also contact Dr. Esther Haskvitz at the Institutional Review Board of The Sage Colleges at haskve@sage.edu. I thank you for your consideration and hope to work with you in this study. Your participation will help to create a picture of the current status of environmental sustainability in New York State. If you wish to participate, please go to https://www.surveymonkey.com

Sincerely, Jennifer Spring
Doctoral Candidate
Sage Graduate Schools Albany, NY

APPENDIX D

Follow Up Emails to Superintendents
Sent after one and two weeks after survey is originally sent

From: Jennifer Spring
Date:
To: Superintendents

To: [Email]
From: sprinj@sage.edu
Subject: Reminder: Environmental Sustainability Survey
Body: Dear Superintendents,

Last week you received an email requesting your participation in a 10-12 minute survey related to my doctoral research about the extent to which New York State public superintendents believe they have led their school districts in environmental sustainability efforts**.**

If you have already completed this survey, I thank you! If not, I invite you to take a few minutes to complete it. The SURVEY WILL CLOSE on Monday, February XX @10:00 pm.

Your responses are greatly appreciated and critical to the success of this study!
http://www.surveymonkey.com

Thank you for your interest in environmental sustainability and for participating in this study!

Sincerely,

Jennifer Spring
Doctoral Candidate
Sage Graduate Schools, Albany, NY

Reminder 2:
To: [Email]
From: sprinj@sage.edu
Subject: Final Chance to Participate in Environmental Sustainability Survey
Body: Research Study on Environmental Sustainability Efforts of NYS Public School Districts

Two weeks ago you received an email requesting your participation in a 10-12 minute survey related to my doctoral research about the extent to which New York State public

superintendents believe they have led their school districts in environmental sustainability**.**

If you have already completed this survey, I thank you. If not, I invite you to take a few minutes to complete it. The SURVEY WILL CLOSE on Monday, February XX @10:00 pm.

Your responses are greatly appreciated and critical to the success of this study!

Thank you for your interest in environmental sustainability and for participating in this study!

Sincerely,
Jennifer Spring, Doctoral Candidate, Sage Graduate Schools Albany, NY