Summer 7-25-2016

How does composting at school change the way middle school students perceive their ability to positively impact the earth?

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HOW DOES COMPOSTING AT SCHOOL CHANGE THE WAY MIDDLE SCHOOL STUDENTS PERCEIVE THEIR ABILITY TO POSITIVELY IMPACT THE EARTH?

by

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A capstone submitted in partial fulfillment of the requirements for the degree of Master of Arts in Education: Natural Sciences and Environmental Education.

Hamline University

Saint Paul, Minnesota

Summer 2016

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CHAPTER ONE

Introduction

As a child, the earth always seemed like a giant object on which I could have little to no influence. I was only one of approximately 6.5 billion people as a child, and my actions, and the consequences of those actions, always seemed so small in the grand scheme of the world. However, if we were to combine the actions of all the individuals on the planet, the consequences, whether positive or negative, would be enormous. Making small changes within a local community can improve our planet's future, which is where my research question stems from: how does composting at school change the way middle school students perceive their ability to positively impact the earth? It is my belief that this one small change in behavior at school can influence the way students view their waste as well as their ability to have a positive impact on the natural world around them.

Early Childhood

The Midwestern United States is where I call home. Growing up as the middle child in a first-ring suburb of a large metropolitan area, my parents were constantly teaching us new ways to be responsible: whether it was helping with the laundry, giving the dog a bath, or taking the garbage out to the curb for pick-up. My parents were firm believers

that we should understand the reasoning behind lots of things we did at home, including recycling. I remember being able to recycle only a few items as a child, such as old newspapers or soda cans; our options with our waste were limited.

We also had a recycling program at school, however it was limited to paper only. At my elementary school, we had lessons in the beginning of each school year about what types of things went into the garbage can and what types of things went into the recycling bin. Since recycling at school at the time was limited to paper, it was relatively easy to sort waste, even for young children. The message was simple: recycle what you can, but don't recycle everything. We were also taught that even if there was one thing in the recycling bin that didn't belong, none of the items in the bin would be able to be recycled. This fact forced us to truly think about what types of items we were putting into each bin.

Adolescence

The recycling program in the city where I grew up changed sometime when I was in high school. With this change, people could recycle lots more things, including many different kinds of plastics. Each plastic container was labeled with a different number indicating the type of plastic used to make it. The confusing part about this was that only certain numbers could be put in the recycling bin. Also, the numbers that were recyclable were not constant; new ones were always being added to the list. How was I supposed to remember such small details about recycling when I was truly worried about all the things typical high schoolers are concerned with? I started recycling everything that was

plastic, regardless of the number on the container, with the thought that the people on the other end of the recycling process could do the sorting, if it was truly that important.

It is during this time in my life that I remember starting to hear about some of the problems that humans have created for the earth. Buzz words like "global warming" and "climate change" became much more common in the media, and also much more common in my life. At my high school, however, just outside of a big city, there were no classes offered on these topics, and, therefore, I was not well informed. Since we still had dial-up Internet at my house, I had limited resources to use to better educate myself. The library did not have current information on these issues, and I remember them being almost taboo at the time: why should we admit that we've done something bad? Climate change seemed like something we couldn't stop anyways, so why would we spend time talking about it?

My late teenage years are when I first remember becoming intrigued by this debate - was this something that was truly happening on earth? Were humans that big of a problem for the rest of the natural world? Many children examine their worldviews and their relationships during their adolescent years, which makes them some of the most influential years in a person's life.

College Years

Having grown up in the city, college was a time of many new experiences for me. I attended a smaller public university, located right on the beautiful Mississippi River. The campus was appealed to me because I needed to immerse myself in the nature surrounding the school to truly find who I was as a person. During my time at the

university, I paid much more attention to how our actions as humans affect the natural world. I spent many days running around the lakes in town, seeing so much garbage and waste on the edges of the trails and thinking, “why do people think this is okay?” I couldn’t possibly pick it all up and carry it with me; I felt as though I could not help the situation.

Our campus had a strong recycling program, but composting was still not that widely used as a waste management option. One of the clubs on campus did some composting on a very small scale, but it was not an option in any of the school cafeterias or in any of the buildings on campus, other than the science building. The only options I had for my waste were the garbage can or the recycling bin. The latter option was widely available at school, though, which felt like enough during the time I lived on campus.

With the exception of my first year at college, I lived off campus with a few other female students. Each year, we had a different landlord, yet none of them offered recycling at the house. This baffled me - having grown up recycling at my parents’ house, I had assumed that everyone, everywhere, was recycling. I couldn’t have been more wrong. It was so difficult to make recycling work at my college houses, even though the other girls I lived with also wanted to participate. We would have to store all these empty, recyclable containers in our kitchen or garage and deliver it to the recycling center ourselves. As college students, this seemed like one more thing we had to worry about making time for; we eventually stopped recycling all together at our house.

Post College

Since I graduated from college, I have made a point to educate myself on environmental issues. The term 'ecological footprint' is now widely used to refer to the negative impact that an individual has on the earth. However, there is another term that not many people have heard of: the 'ecological handprint'. This term refers to the things we, as humans, can do to impact the earth in a positive way. In my opinion, this is a much more useful way of looking at the world because it means we can contribute to it instead of always taking away from it.

As an adult, I am much more free to make choices about my waste management. I recycle at home as much as possible, and have composted in the past. I do not currently compost at home due to the fact that the apartment I rent does not provide an area for residents to compost. In an average week, though, I recycle more waste than I put in my garbage can.

I am a middle school science teacher in a low-income, urban-suburban school district. I teach mostly seventh grade life science and have been doing so for the past six years. In my school, we educate a wide range of students: different ethnicities, different home languages, different socioeconomic statuses, and different ability levels, among many other things. The childhood experience for most of my students is vastly different than my own experience, which definitely impacts the way they perceive the world and their place in it.

One of the things that astounds me year after year is that my middle school students have a difficult time differentiating between what waste is recyclable and what waste is

garbage. All of the elementary schools in my school district recycle, and, being in an urban-suburban setting, recycling is common practice in the school's community. However, at school, we are doing an abysmal job of teaching our children the difference between garbage and recycling. I am not sure whether it's apathy from the students concerning the topic or whether they truly do not know what to do with their waste; either way, this issue is of great concern to me. On top of that, another point of confusion for my students is what to do with food waste: is it garbage? Or is it recyclable? The answer is: neither. We need to give students a third, more environmentally friendly option - composting.

My biggest hope in bringing composting to my school, even on a small scale, is that it reinvigorates the conversation for students about ways that we, as humans, can positively impact the earth. In my opinion, too much of the conversation surrounding the earth is about the footprint; I want to flip the conversation around and focus more on the handprint - how can we improve the way we live while also making the earth a better place for future generations?

Summary

Throughout my childhood, I remember being conscious of the waste I was producing – not so much the volume of the waste, but the ways I disposed of it. Both my family and my school insisted that I understood what my options were for disposal, even if they were much simpler back then. As I grew older, systems changed and new systems were introduced, causing confusion at times, but also piquing my interest in waste management options for all people. It is essential that today's students also have this experience.

Because they are the leaders of tomorrow, we, as educators, need to give these students the same opportunities my generation had to be aware of all the options on the table, including composting.

In chapter two, a review of the literature surrounding the research question will be conducted. The literature review will serve as a foundation for the research for this capstone and will also weave together the four major concepts that are cornerstones in this project: adolescent ecological identities, environmental education, service learning, and composting.

CHAPTER TWO

Review of Literature

Introduction

In order to conduct the most meaningful work possible, an examination of literature surrounding the research question is necessary. The research question being examined for this capstone is: how does composting at school change the way middle school students perceive their ability to positively impact the earth? There are four major topics that require research in order to create the most effective and informative capstone: adolescent ecological identity, environmental education, service learning, and composting.

These fours topics are woven together in the intended service-learning project. Through participation in the project, students will become more self-aware of their place in the natural world as well as their impact on it. Education is the key for helping to create the more informed and ecologically aware citizens that are necessary for revitalizing the earth. Composting is a small piece of the larger puzzle that can help change the way humans make an impression on the world, but this one small piece can be a catalyst for bigger changes in the future.

Adolescent Ecological Identity

Definition of ecological identity. According to Thomashow in his book, *Ecological Identity: Becoming a Reflective Environmentalist*, ecological identity is a term that is used to describe "all the different ways people construe themselves in relationship to the earth as manifested in personality, values, actions, and sense of self" (1996, p. 3). Because the earth can be viewed in many contexts, such as a single planet in the solar system, a self-sustaining entity, or a unique living thing, this definition can mean different things to people of different cultures, depending on which view of the earth they hold.

Thomashow (1996) goes on to say that a person's ecological identity helps determine what, if any, actions he/she will take to either help or harm the environment. The main mechanism that can change a person's ecological identity is education. Even a brief discussion of environmental issues or a basic understanding of ecology can change the way a person views his or her connection to the earth, both for the good and for the bad (Thomashow, 1996).

Other than education, there are three main notions that can shape a person's ecological identity: childhood connections and memories of nature, perceptions of environmental disasters, and spending time in nature itself (Thomashow, 1996). Tesh expands on these three facets of ecological identity in her book *Uncertain Hazards: Environmental Activists and Scientific Proof* (2000). Tesh states that people's actions towards the environment are based on their experiential knowledge, which is a combination of all three of Thomashow's notions. In short, if everyone's experiential knowledge was

synthesized, the greatest good for the greatest number of people would arise out of the decisions made for the environment.

Ecological identities. In his book, Thomashow (1996) discusses two main branches of ecological identity, or different ways of viewing one's relationship with the earth. The two branches of ecological identities include preservation and conservation. According to Thiele (1999), one of the things preservationists and conservationists have in common is that the main goal of both viewpoints is to keep nature safe and healthy in the long term. Both parties see the benefits of nature in that they view nature as essential to keeping the human population alive and healthy.

Although commonly used interchangeably, preservation and conservation are two, somewhat opposing views on how humans should interact with the environment. Preservationists strive to preserve the environment solely for the sake of the environment; conservationists seek to conserve the environment from the lens of keeping natural resources in abundance for future use (Thiele, 1999).

John Muir is perhaps one of the most famous preservationists of all time. Muir's perspective on how humans should interact with the environment is that humans are not responsible enough to use it wisely - every piece of natural, undisturbed land that still exists should be preserved and have restricted-use rules (Thomashow, 1996). The land should not be preserved for future human use, but preserved rather solely for nature's sake. Preservationism is the more ecocentric of the two branches of ecological identity, placing a bigger importance on nature simply for the sake of nature (Thiele, 1999).

Muir's preservationist stance on environmental usage can be summed up with this personal quotation:

> "Thousands of tired, nerve-shaken, over-civilized people are beginning to find out that going to the mountains is going home; that wildness is a necessity; and that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life" (Magoc, 2011, p. 60).

He was a staunch believer that humans need a strong connection with the natural world to help keep it healthy. Humans need to believe that they are part of the bigger picture of nature, not a separate entity (Wolfe, 1978).

On the other hand, Theodore Roosevelt, the 26th president of the United States, is one of the most famous conservationists. Like Muir, Roosevelt also believed that land and natural resources need to be preserved, but the purpose for the preservation is vastly different (Thiele, 1999). Roosevelt believed that people were capable of a "sportsman code", where hunting for food, or market hunting was no longer acceptable; hunting to help preserve the hunting culture for the elite circle was more appropriate (Magoc, 2011).

During his nearly eight years as President, Roosevelt created a legacy of setting aside natural land. He created "150 national forests, established 51 federal bird reservations, designated four national game preserves, designated five new national parks, and recognized 18 national monuments", a total of over 230 million acres of land (Magoc, 2011, p. 60). This may seem like an overwhelmingly preservationist legacy at first glance; however, the reason for the preservation was not simply for nature's sake.

Being a politician, Roosevelt was acutely aware that those preserved resources would most likely need to be consumed in the future, for the sake of the people living on the land. He believed that humans would be able to responsibly manage the use of the land, and that stewardship towards the environment, or interest about the health of the environment, would help preserve as much natural land as possible for as long a period of time as possible (Thomashow, 1996).

Although they may seem like complete opposites, both the preservationist and the conservationist viewpoints of the human-environment relationship believe in preserving natural lands and natural resources. The greatest difference between these two branches is the reason behind preserving the land. There is no simple answer for which viewpoint is best with which to align oneself. The decision becomes extremely personal and also dependent on the situation at hand.

Character traits of pro-environmental adolescents. Although there is no exclusive formula of character traits for a pro-environmental person, there are a handful of traits that the majority of pro-environmental adolescents share. According to a study conducted by Boeve-de Pauw, Donche, and Petege (2010), female adolescents tend to hold more pro-environmental attitudes than male adolescents do. Boeve-de Pauw et. al. (2010) also suggest that adolescents who are well organized and goal-oriented are more ecocentric than adolescents who hold neither of these character traits.

According to the same study, there are also a few character traits that correlate with a less environmentally friendly attitude. This list includes being easily irritated, dominant, and selfish (Boeve-de Pauw et. al., 2010). Character traits that don't seem to matter in

regards to being pro-environmental are extraversion or introversion, imagination, and emotional stability (2010). It is important to note that the study claims the correlation between each of these personality traits and having a pro-environmental attitude was small, in all cases, indicating that people of all personality types are capable of holding environmentally friendly perspectives.

Impacts of education on ecological identity of adolescents. In recent years, many studies have been conducted concerning the impact of environmental education on the ecological identities of adolescents. There are many activities an educator can choose to have students participate in, both inside and outside of the classroom walls, but one question still remains: which activities and experiences will have the greatest influence in creating a more positive ecological identity for students?

Researcher Blatt set out to uncover the answer to this question by observing and interviewing high school students as well as a teacher in an elective environmental education course (2014). Students in the class participated in the following activities throughout the course of the semester: completing an online ecological footprint activity, making a list of all personal possessions, attending a field trip to a local landfill, viewing various videos and documentaries, and participating in a mock town meeting, a debate, and Socratic discussions (2014).

Depending on the student, each of these activities had a slightly different impact. Each was found to have a significant impact on at least one student, in the sense of either affirming their ecological identity or contradicting it (Blatt, 2014). Each activity was also designed to force students to think critically and take a stand on one side of each issue

presented (Blatt, 2014). This critical thinking piece is essential in helping students gain a more positive ecological identity because, by thinking more deeply about environmental issues, students will truly understand the core of the issues and be able to support their own opinion about those issues with factual evidence. The question still remains, however, as to why each activity affected the students they way it did. What is the connection?

In addition to critical thinking activities, a study conducted by Dresner and Fischer found that students who consistently participated in stewardship activities throughout the school year had a more positive ecological identity by the end of the school year (2013). These students participated in activities focused on clearing out invasive plant species in their community and replacing them with plants that are native to the area (Dresner et. al., 2013). It is important to note that the subjects in this study had also elected to be part of a special environmentally based middle school program in their district. However, engaging students in ecological handprint activities can have a powerful role in the creation of positive ecological identities.

Environmental Education

Definition of environmental education.

The term "environmental education" is not easily defined; if two experts in the field were asked to provide one, each would most likely give a vastly different definition of environmental education, based on the personal interests of each expert. Short (2010) raises this consideration when thinking about how to define this term; he says that the word "environment" means different things to different people, especially those in different scientific disciplines. The word "education"

also has many meanings, as well as many different approaches and methodologies (2010). If these two semi-ambiguous terms were combined, the possibilities of the meaning are endless.

The Tbilisi Declaration (1977) was the first document that formally attempted to define the term. The five major characteristics of environmental education, according to the Tbilisi Declaration (1977), are as follows: 1. must be implemented at all age levels; 2. must examine environmental issues from every angle, including social and economical aspects; 3. must be interdisciplinary; 4. must include learning not just about the environment, but also from the environment; and 5. must be relevant to the learner, meaning that issues studied should be present and important in the learners' lives.

Hungerford (2010) adds to the characteristics listed in the Tbilisi Declaration, and goes on to say that environmental education should help students, no matter their age, understand environmental issues and also think critically about possible solutions to those issues. This aspect, of being solution-oriented instead of simply examining current environmental issues, is fundamental to making this discipline one that has a considerable impact on the world.

Short (2010) expands upon these ideas by saying that environmental education is not only teaching in the environment and about the environment and environmental issues, but also "education 'for' the environment" (p. 8). Environmental education aims to produce critical thinkers that have personal investment and interest in helping to solve environmental problems not only for personal reasons, but also for the sake of the environment itself and the entire world (Short, 2010).

Often, environmental education and education for sustainable development (ESD) are terms that are used interchangeably. The two disciplines are not the same, but do support each other in a number of ways. ESD has a greater focus on the habits of mind that can be formed to truly change behaviors; environmental education's largest focus is on environmental issues and problem solving surrounding those issues (McKeown and Hopkins, 2005). One goal these sister disciplines share is this: to enlist the help of all learning disciplines, not just science, to foster more positive attitudes and behaviors towards the environment.

Goals of environmental education. Despite its age, the Tbilisi Declaration (1977) is still widely cited as the best guide as to the true objectives of environmental education. The three main goals of environmental education, according to the Tbilisi Declaration (1977), are as follows:

> a) to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas; b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; c) to create new patterns of behaviour of individuals, groups and society as a whole towards the environment.

Short condenses these three goals into two, more concise goals: "responsible citizenship actions" and "environmentally significant behaviors" (2010). Developing citizens who are capable of acting responsibly towards the environment in the long-term is an important outcome for the field. Educators can teach about "environmentally significant behaviors", but if they do not transfer into long-term lifestyle shifts, this

particular goal of environmental education will not have been met, and efforts will seem fruitless and unproductive.

According to Short (2010), "an action initiated by one student or group may achieve little in terms of EQ [environmental quality] impact but may be a catalyst for subsequent efforts resulting in more significant impacts" (p. 16). Even if environmental education continues to operate mostly in a local fashion, the long-term and butterfly effects are unknown at this point, due to the relative youth of the discipline. Exposing one student to an environmental idea could have a bigger impact than initially thought - in order to have any influence at all, though, exposure at a young age is essential.

Support from the United States' government. Following the writing of the Tbilisi Declaration in 1977, there have been only a few actions taken by the federal government of the United States in support of environmental education. Some have been successful in the short term, some in the long term, and some are considered missed opportunities by champions of environmental education. What follows is a brief overview of the two most significant endeavours.

Thirteen years after the Tbilisi Declaration, in 1990, the United States' government passed the National Environmental Education Act (NEEA). The main purpose of the NEEA was to give the Environmental Protection Agency (EPA) the task of organizing an office of Environmental Education (EE) to help support the growing discipline in both public and private schools (Potter, 2010). The office of EE began officially operating two years following the passage of the NEEA, in 1992, and was granted $6.5 million to begin

implementing programs and supporting the EE cause in all schools ranging from elementary schools all the way to colleges and universities (Potter, 2010).

Although the NEEA is a piece of legislation that was passed with the best of intentions, it expired in 1996, exactly twenty years ago (Potter, 2010). The Act was never reauthorized, but Congress continues to support the intended efforts of the Act with, on average, just under $6 million per year (Potter, 2010). To this day, the NEEA is still the only piece of legislation ever passed within the EPA with regards to environmental education.

The only other piece of legislation passed by the United States' government regarding environmental education is No Child Left Inside, a portion of the Elementary and Secondary Education Act of 2002, also known as the No Child Left Behind Act (US Department of Education, 2015). Although this piece of legislation has a similar mission to that of the NEEA, to engage learners both in learning about the environment and for the environment, there are some harsh realities that come along with it.

One of the main problems with both of these pieces of legislation is that they are managed and funded by two completely separate agencies in the government: the EPA and the United States' Department of Education (Potter, 2010). Without proper communication between these two governmental agencies, it is impossible to build a bridge between the programs and have them support one another. Even if they are working towards a common goal, without communication and alignment, the outcome cannot be as great as if they were to work collaboratively.

Another major problem with these two acts is the financial factor. The NEEA has a very broad scope of who and what can be funded by the money: public and private schools, ranging from kindergarten through colleges and universities, formal and informal places of education, and the general citizenry of the United States. On the other hand, the No Child Left Inside Act solely focuses on K-12 students in the public education system (Potter, 2010). Excluding the majority of people who could possibly be influenced by the legislation reduces the possible impact of the legislation. Why this was a decision made by the United States' Congress is a puzzle to most supporters of environmental education.

Challenges to environmental education. Although there are many positive effects that environmental education has had in the past 40 years, the road has not been an easy one. There have been, and will continue to be, many challenges associated with this discipline in schools. First and foremost, formal teacher training programs in most colleges and universities in the United States do not offer environmental education majors, leaving new teachers ill-prepared and under-informed to effectively teach about these topics. Also, the majority of professional development opportunities for current educators is not as high quality as needs to be in order to be effective. Although this need was identified years ago, back in the 1990s, it still exists today (Marcinkowski, 2010).

It is difficult to have confident, knowledgeable educators without the appropriate kinds of preparatory work, whether it be in a college or university or through professional development. Without proper preparation, teaching cannot be as effective as possible, no

matter the grade level or discipline; when teaching is ineffective, goals are not met and disciplines wilt away until they are no longer relevant or attractive to students.

Another challenge in environmental education is that there is no single definition of what it is and what it is not. Without a true definition, educators are privy to include things about human-earth relationships, human-human relationships (as they relate to the earth), sustainable development ideas, and whatever else they personally think should be included (Marcinkowski, 2010). Without a clear-cut, concise definition, the field becomes extremely broad and, in some people's views, out of control. Where does the line get drawn as to what should and what should not be included in the field of environmental education? There is much work that experts as well as educators must do in order to answer this question.

The third major challenge to making environmental education an effective discipline is that much of the research is constantly in flux (Marcinkowski, 2010). Since there are no affirmed theories, no recorded historical perspectives on current issues, and no single right answer, it becomes difficult to teach students about environmental issues without imposing too much doom and gloom on them. The issues at hand are current world issues, and new research is always emerging.

Climate change is perhaps the best example of this phenomenon. Research is currently being conducted in earnest on the topic, as it has been for approximately the last 20 years. This fact puts environmental educators in a tough spot, though, in the following ways: Which scientists are the most credible sources of information? What should educators do

with conflicting research? How prepared are educators to work with people outside the realm of environmental education to better prepare themselves?

Climate change also presents a unique challenge that many other environmental issues do not. It forces the instruction to be about "we" and not about "them" (Marcinkowski, 2010). In studying other environmental issues and disasters, many of which have occurred in the past, there is no accountability for the students; educators simply hope they learn from the mistakes of others. In studying current global environmental crises, such as global climate change and the shortage of non-renewable energy sources, the accountability becomes partially the students'; they are part of the problem, even though they also have the power to change what the future looks like in these regards.

Service Learning

Definition of service learning.

Service learning is an educational methodology in which students become active participants in their communities and worlds while also focusing on specific learning objectives (Afterschool Alliance, 2011; Kaye, 2011). Students, as opposed to teachers or other adults, are the people who identify the problem to be solved with service learning projects (Kaye, 2011). Students are also the drivers of the problem-solving process, taking the lead in planning a course of action and, eventually, executing that plan.

Service learning opportunities can either be integrated into the school day or offered outside of the regular school day. Many times, due to the national focus on improving student scores on standardized tests, service learning opportunities are being forced out of the regular classroom and into an after school setting (Afterschool Alliance, 2011). In

order for the project to remain effective, however, concepts that are taught during the regular school day and are aligned with state or national standards should be incorporated into the project (Newman, Dantzler, Coleman, 2015).

Oftentimes, service learning can be confused with community service. There are two main differences between these approaches to getting students involved in their communities. According to the Afterschool Alliance (2011), the inclusion of an academic focus as well as a reflective piece are essential components in taking community service and transforming it into service learning. Also, students must be the primary planners and implementers for a project to be considered service learning; community service is mostly planned and implemented by adults, with students merely participating in a project (Afterschool Alliance, 2011). Community service, when tied to academic learning, becomes service learning.

Benefits of service learning. Besides having a direct impact on a local community issue, there are many benefits to service learning that directly impact the students who participate in the project. First, service learning helps to build social responsibility within students and communities (Kaye, 2011). This is possibly the most important benefit of service learning, as today's students are the future leaders of the world; if adolescents begin to feel a responsibility to their communities now, they will hopefully stay involved in their communities, no matter which path in life they choose.

Another significant perk of service learning is the academic impact these opportunities have on students. According to the Afterschool Alliance (2011), students in Michigan self-reported better understanding on content being studied in school while participating

in a related service-learning project; students also self-reported being more engaged in learning. More important to officials than to students, incorporation of service learning opportunities into the regular school day has also been linked to increases in student achievement scores on state assessments; the Afterschool Alliance (2011) cites this positive correlation to standardized test scores with sixth-graders in New Hampshire.

Aside from the academic benefits, students can also greatly benefit socially and emotionally from participation in service learning projects. The Afterschool Alliance (2011) reports that students who participate in service learning and volunteer opportunities are less likely to engage in at-risk behaviors, including drugs, alcohol, and dropping out of school. Students who partake in these opportunities have also shown higher levels of self-confidence, more positive peer influence, and the eagerness to hold more leadership positions at school and in their communities (2011).

Drawbacks to service learning. Although there are many benefits to service learning, there are some challenges that come along with taking on such a large, interdisciplinary task. The largest of these challenges is the financial burden many of these projects carry. The majority of public schools in the United States are not able to fund productive service learning opportunities on their own, forcing teachers and students to put in extra time and energy into finding the financial resources for these projects.

Many of the case studies reviewed listed multiple community business partners as financial contributors to the projects. This requires both the willingness of those community businesses as well as the time and effort of participants to reach out to those businesses to ask for assistance. There are grants and other sources of income available to

schools, but, again, those require extra time and extra effort to go through the application and acceptance processes.

A model for strong service learning opportunities. According to Newman, Dantzler, and Coleman (2015), in order for service learning opportunities to be strong and successful for students, there are five key elements or steps that should be incorporated into the project: 1) investigation of a need, 2) preparation and planning, 3) implementation of the plan of action, 4) reflection on the project, and 5) celebration or presentation of the project.

Service learning projects and opportunities are much more effective and meaningful for students when they are student-driven, as opposed to having adult leadership (Kaye, 2011); each of the five steps presented by Newman, et al. (2015) should be mostly student-driven as well. The adult who is supporting the service learning opportunity, whether he or she is a teacher or a community member, should take on more of the role of a facilitator or guide for students, providing assistance when necessary, but also allowing students to take the project in their own direction (Newman, et. al., 2015).

Examples of environmentally based service learning opportunities. There are many examples of successful service learning opportunities that have been conducted in schools across the United States. Many of these are environmental in focus, and many are not. The following two examples are impeccable projects that truly encapsulate the idea of service learning - combining community service with academic concepts from the regular classroom.

The first example involves college-age students from Clemson University designing and building a children's water garden (Byrd and Haque, 2007). In partnership with the South Carolina Botanical Gardens and a program called Sprouting Wings, students at Clemson University helped create a water garden that includes multiple ponds, waterfalls, and other wetland environments. The water garden also has paths, bridges, and observation decks to allow visitors of all ages to become engaged with the garden and explore all the plants, wildlife, and aquatic features it offers.

The students from Clemson University chose plants that are native to that particular region of South Carolina (Byrd and Haque, 2007); this decision was made to keep the maintenance levels of the water garden as low as possible and to provide the best chance for successful plant growth. One interesting group of plants included in the garden were the carnivorous plants in the bogs, including Venus flytraps and pitcher plants. Because of this particularly captivating group of flora, the bog, an ecosystem that does not tend to be well known, is often the most popular spot in the garden.

This service-learning project conducted through Clemson University has had a grand impact on the surrounding community. Students from local schools are able to visit the gardens and interact with nature, which happens less and less each year due to urban sprawl (Byrd and Haque, 2007). The Clemson students were integral planners and designers for the water garden and have provided many opportunities for younger children to observe, interact with, and learn from natural aquatic environments.

This children's water garden project seems to have been so successful partially because of the partnership with the South Carolina Botanical Gardens. The Botanical

Gardens provided information and resources on native plant life as well as the financial resources required to build this dream garden. Without the financial assistance, the water garden may have remained a dream instead of becoming a beautiful, educational reality.

The second exceptional example of service learning involves a partnership between middle school students and college-level oceanography students on the Hawaiian island of Kauai. In this project, students at both levels worked together in an eight-week study of the marine environment surrounding the island. In regards to the middle school students, many areas of science standards were addressed in these eight weeks, including the scientific method, ecology, sustainability and conservation issues, and natural systems (Stepath and Bacon, 2010).

The students learned about the basics of these content areas, then were taken on a field trip, where samples were collected and debris was gathered from a local beach. While at the beach, students also were engaged in activities involving beach ecosystems and topography, reef ecosystems and observations of the tides. Samples of beach debris as well as water and sand samples were studied following the field trip, back in the regular classroom (Stepath and Bacon, 2010). Not only were students engaged in scientific processes, but they were also conducting a beach clean up that benefited the shore ecosystem, which is so precious and fragile.

The piece that seemed to be the most important for success in this service-learning project is the fact that the students' lives and families were directly tied to and impacted by the beach. In this community in Hawaii, maintaining the beach and keeping it clean are points of pride in the community. Since the majority of students go to the beach

themselves outside of the school day, they had a direct buy in to the project. The students had an opportunity to write and speak about why this project was important in a report and presentation that were completed after the field trip, which according to Newman, et. al. (2015), is an essential component of successful projects.

Composting

Definition of composting. In the most basic terms possible, composting is an all-natural waste management technique where decomposition of organic materials takes place (Buelin-Biesecker, 2014). Living organisms are essential to the decomposition process, although the type of organism can range from macroorganisms, such as earthworms, millipedes, and snails, to microorganisms, like tiny fungi and bacteria. The job of the macroorganisms is to physically break organic waste down into smaller chunks; the job of the microorganisms is to chemically decompose those smaller chunks of waste into reusable matter for the earth (Cornell Waste Management Institute, 1996). Both are essential to a successful compost pile.

History of composting. Composting has become a much more common household word in the last ten years. However, composting has been a waste disposal practice for thousands of years in many cultures. Before the time of processed foods, all food waste was organic; humans obtained all food from the earth in the form of plants and animals. All food waste, which also used to be smaller in volume, could be disposed of anywhere, and natural decomposition would occur.

Although industrialized countries had developed alternate waste management systems, around the mid-twentieth century, there was a surge in interest in composting practices in

modernized countries (Golueke, 1972/2009). Composting was largely seen as unhygienic, and much of the research at the time was focused on making sure the practice was safe and hygienic for families and companies (Golueke, 1972/2009). Another theme for the research surrounding composting in the 1950s was how to expedite the process and be able to make financial gains from composting, regardless of the effects on the environment (Golueke, 1972/2009).

In 1965, the United States' government passed the Solid Wastes Disposal Act (SWDA), changing how Americans thought about their waste (Golueke, 1972/2009). The main goal of the SWDA was to provide assistance and resources for state and local governments to refine solid waste management systems (SWDA, 1965). A secondary focus of the SWDA was to improve waste management techniques to lessen the negative effect on the environment. (SWDA, 1965).

The SWDA existed in its original state until eleven years later, when, in 1976, it was modified into the Resource Conservation and Recovery Act (RCRA). According to the United States Environmental Protection Agency (EPA),

> the objectives of the Resource Conservation and Recovery Act (RCRA) are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner (EPA, 2016).

This piece of legislation took waste management to the next level by focusing more on the effects of our waste on the environment. This federal law is still in effect today, in

2015, although much of the control for enforcement of the law has been given to individual states (EPA, 2016).

Composting in the 1970s followed many of the trends of the 1960s - research on the practice slowed, but the research that was conducted was based on the work of the "founders" of modern composting: Howard and Van Vuren (Golueke, 1972/2009). It was in the 1970s that technology continued to evolve, and the usefulness of the final composted product was seen. Many gardeners and farmers began to use this final product in place of manure or other chemical soil fertilizers whenever possible (Golueke, 1972/2009).

Since the 1970s, most developments in composting have been technologies that make the process simpler and more streamlined for larger composting operations that exist on commercial farms and other such places. Advancements have been made in both the moisture control process as well as the aeration process (Yepsen, 2009).

Benefits of composting. Composting has numerous benefits to the natural world, and, in turn, to humans. Decreasing the amount of garbage humans put in landfills each year is the number one benefit. According to a study done by the EPA, from 1990 to 2012, the amount of solid waste making it to landfills annually has dropped significantly, from 145.3 million tons to 135.0 million tons, respectively (EPA, 2016). This is partially due to both strong recycling and composting efforts in the United States.

Another notable perk to composting is the by-product of the process, which can be used as a fertilizer that is free of chemicals (Buelin-Biesecker, 2014). By using this recycled fertilizer, other resources that are normally used in the creation of fertilizers are

preserved, keeping many of these chemicals out of the water supply, which in turn keeps it clean for drinking. The composting by-product is full of nutritious minerals and compounds that plants, particularly crops, need as part of a successful growing season.

When done correctly and long-term, composting can also provide financial benefits to the composter. The producer will save money on fertilizer costs, and, if enough by-product is produced, it can be sold to others for use as a fertilizer. It can also save citizens approximately 50% of the cost of other pollution clean up options for water, soil, and air by helping to keep the usual chemicals out of the environment (EPA, 2016).

Drawbacks to composting. Sometimes, composting can produce a horrible odor, causing people to not want to continue the practice. This odor is usually a result of a chemical imbalance between carbon and nitrogen in the composting bin (Cornell, 1996). This foul odor can also surface if there is not enough aeration in the composting bin, which can lead to problems with moisture control (Cornell, 1996). When done correctly, little to no smell should be produced by a healthy compost pile.

Composting in schools. According to a study done by the Minnesota Pollution Control Agency, "Minnesota's public schools generate more than 240 tons per day of waste, of which over three-quarters could be diverted to recycling and composting program" (Solid Waste Report, 2010). According to the same report, approximately one-quarter of the total waste produced was food waste, which could easily be composted instead of thrown away in a trash receptacle to eventually end up in a landfill.

Public schools in San Francisco, California, are some of the first schools to have an "organics diversion program", where food waste and used paper products are collected at

the schools and taken to composting facilities (J.G., 2005). Both in San Francisco and in other cities across the country, composting is starting to become a community activity; farmers, businesses, schools, and families are all starting to participate to help make the biggest impact possible (J.G., 2005).

Conclusion

The ecological identities of adolescents are the main focus of this capstone. These identities are malleable, but it is vital that adolescents are educated both early and effectively about how they can best impact the earth in positive ways, realizing they have an ecological handprint. Opportunities for service learning offer rich experiences for students to become active in their communities while engaging in ecological handprint activities. Composting at school offers a unique opportunity for students to impact not only their community, but also the entire planet, in a positive manner.

Chapter three presents the methods that will be used to research the following question: how does composting at school change the way middle school students perceive their ability to positively impact the earth? The methods and tools to be used will be discussed in detail; the participants will also be described.

CHAPTER THREE

Methods

Introduction

The research for this capstone took place during an after school, service learning project for middle school students centered around the idea of composting and waste management. The research question addressed in this capstone was: how does composting at school change the way middle school students perceive their ability to positively impact the earth? In chapter three, methods for the research that was conducted are discussed, as well as the demographics of the participants of the project.

The research that was conducted employed a mixed methods approach, using both quantitative and qualitative data collection methods to create the most comprehensive research possible. In this chapter, those methods are discussed in detail. The tools used to collect the data for this capstone are described and rationalized, as well.

Research Paradigm

In order to gather the best data concerning the research question, a mixed methods approach is the most appropriate paradigm. The mixture of qualitative and quantitative data provided the most descriptive insight as to positive and negative changes in student attitudes towards their ability to positively influence the environment.

The qualitative data, collected through student journals and interviews, provided insight into the nature of the changes that transpired in students' attitudes towards their influence on the environment. The quantitative data provided a measure of the magnitude of change regarding student attitudes, showing how much their attitudes and beliefs about their influence was either transformed or not transformed by the class. Using a combination of these methods provided the clearest picture of what changes came to light through this research as well as how large or small those changes were.

Research Method

A mixed methods research approach was chosen for this particular study to provide the most comprehensive view of how a service learning composting project at a public middle school impacted student attitudes towards their ability to have a productive impact on the environment. Mills (2014) states that using multiple sources of data, in a method called triangulation, is the most effective method for collecting data. Relying on multiple sources as opposed to a single source allows the researcher to acquire a more accurate picture of what the data from the study is actually showing (Mills, 2014).

The quantitative portion of this study consists of a ten item questionnaire that students completed both at the beginning of the service learning project as well as at the conclusion of the project. The Likert scale questionnaire was designed to measure students' attitudes towards the environment. A comparison of before and after data will be conducted. The qualitative pieces of the study are student journals as well as student interviews. These qualitative tools provided insight into the specific changes and shifts in

students' attitudes about environmental issues as well as their ability to have a positive impact on the environment.

Setting

The research for this capstone was conducted at an urban-suburban middle school in the upper Midwest. The school served 740 students in grades six through eight. The racial breakdown at the school was as follows: 32% White, 28% Asian, 24% Black, 14% Hispanic, and 2% American Indian. The English language learners at the school comprised 14.3% of the total student population. 1% of the student population was considered homeless at any given point during the school year.

During the year of the study, 57% of students who received their education at this school received either free or reduced lunch prices. This high percentage of the student population indicates that this is an area of high and increasing poverty. The multiple feeder elementary schools also had higher percentages of students who qualified for free or reduced lunch prices, corroborating the trend.

Participants

All participation in the research for this capstone was on a voluntary basis. Students self-selected for the after school class based on the idea of composting and waste management. All students attended the same mid-western middle school, and were in grades six and seven. One requirement of participation in the class was that students were earning passes grades, As, Bs, and Cs, in all academic classes. The rationale behind this stipulation is that academics should have remained the number one priority both of the students participated as well as the researcher, who was a teacher at the same school.

Methods

The service learning project began in April of 2016. During the registration process, students who were interested in the class as well as their parents were notified of the intent to do research throughout the class and were also given the opportunity to opt out of the research study while still participating in the after school class. Copies of the notices used are included in Appendix A.

During the first week of the class, students completed a questionnaire designed to measure their initial attitudes toward the environment. The questionnaire is called the New Ecological Paradigm scale for Children (NEP-C). There were ten items on the questionnaire, and students responded to each item using a Likert scale from 1 to 5, indicating whether they strongly disagreed to strongly agreed with each statement, respectively. A copy of the questionnaire used is included in Appendix B.

Throughout the course of the class, which lasted from April to May of 2016, students participated in various activities focused on composting as well as human consumption and human waste. Students were required to write in a journal. Students were provided with journal prompts based on the activities they participated in, but there was also freedom for students to share thoughts and feelings related to topics discussed and studied both in the class and in their personal lives. A list of journal prompts used throughout the study is included in Appendix C.

After the completion of the study, students participated in one-on-one interviews with the researcher. Students were given interview questions prior to the actual interview; this gave the students time and thinking space to prepare responses of which they were

confident and satisfied. Comfort in these interviews was essential in getting honest and genuine responses. Interviews were recorded and later transcribed. A list of interview questions that were used is included in Appendix D. At the interview meeting with the researcher, students also completed the same ten-item, Likert scale questionnaire to evaluate their attitudes towards the environment.

Tools

The ten-item, Likert scale questionnaire that students completed at the beginning and the end of the afterschool class is called the New Ecological Paradigm for Children (NEP-C). This particular questionnaire is based on the New Ecological Paradigm, which was originally designed for adults. The three subtopics included in the questionnaire are "rights of nature, "eco-crisis", and "human exceptionalism" (New Ecological Paradigm for Children (NEP-C)). A copy of the NEP-C can be found in Appendix B.

Student journals were full of student writing reflecting on topics discussed and studied in the afterschool class and their connections to their lives outside of the class. A list of prompts for student journal entries that were used throughout the class are included in Appendix C. One-on-one student interviews with the researcher were reflective for students, providing them with a safe space to voice their feelings about the after school class as well as changes they noticed about themselves. A list of interview questions that were used is included in Appendix D.

Data Analysis

Data collected from the NEP-C was analyzed for differences between the pre-class data and post-class data. Average scores for each item were calculated, both for the pre-

class data as well as the post-class data. Positive changes as well as negative changes were recorded and interpreted. Average pre-class and post-class scores for each individual student were also calculated and analyzed.

With regards to the student journals, evidence of shifts in attitudes and beliefs were recorded for individual students as well as for the entire group. Also, common themes and ideas were noted as evidence of shifting attitudes, both in positive and negative directions. Student interviews were analyzed and interpreted in a similar fashion to the student journals.

Summary

This research study employed a mixed methods approach, using both quantitative and qualitative sources of data; this mixture of methods was chosen in order to provide the most comprehensive results possible for the study through the use of triangulation. The middle school students who voluntarily participated in the study all attended the same, low-income school in an urban-suburban area in the upper Midwest. Through the use of a ten item, Likert scale questionnaire, student journals, and student interviews, the researcher investigated whether or not composting at school has an impact on the way middle school students perceive their ability to influence the environment in a positive way.

In chapter four, a description of the participants and setting of the study are provided. A brief overview of the afterschool class is also included. Finally, the three sources of data mentioned in this chapter are analyzed and interpreted.

CHAPTER FOUR

Results

Introduction

In order to make the most meaning out of this capstone study, a thorough examination and analysis of the data collected needs to be performed. The research question investigated in this capstone is: how does composting at school change the way middle school students perceive their ability to positively impact the earth? In chapter four, the data collected throughout the capstone will be analyzed, interpreted and connected back to the research question.

A brief description of the setting of the study as well as the participants of the study is included in this chapter. A mixed-methods approach was chosen for this particular capstone. One quantitative and two qualitative data collection methods were used. Each will be examined and analyzed in its own right, with a synthesis of all three data sources to follow. Data will be analyzed both for intensity of changes in student attitudes towards the environment as well as for patterns in the nature of those changes.

Setting and Participants Involved

This study was conducted in a low-income, urban-suburban middle school in the upper Midwest. The afterschool class was conducted from the beginning of April of 2016

to the end of May of 2016. Eight students elected to participate in the class, and all eight of those students elected to participate in the study. The racial breakdown of the participants was as follows: 62.5% Asian, 25% White, and 12.5% Black. All eight participants were females. With both qualifications listed, it should be noted that this is not a representative sample of the whole school population. It is also worth noting that 75% of the participants were in seventh grade and 25% were in sixth grade during the 2015-2016 school year; no eighth graders opted to participate. English Language Learners (ELLs) comprised 75% of the total participants in the study.

Afterschool Class Activities

Each class session was held on Tuesdays after school and was approximately ninety minutes in length. The participants in the afterschool class engaged in a variety of activities. During the first session of class, students completed the New Ecological Paradigm for Children (NEP-C). They also engaged in a team-building exercise in which a 15-question, multiple choice questionnaire about waste was completed in two teams (Humes, 2012); a copy of the Waste Q&A is included in Appendix E. A group brainstorm was held as to what the students were hoping to do during the class as well.

One of the activities that students listed during the brainstorm session was cleaning up garbage both on school grounds and in the surrounding community; this was the activity chosen for the second session of class. Participants travelled to a small pond habitat approximately two blocks from school to clean up. With garbage bags and rubber gloves, students were actively engaged the entire time, discussing what they were finding and how they thought those items might have ended up where they did instead of in the trash.

Sessions three, four, and five were spent building a box for compost from scratch. Wood, nails, tools, and a rough plan were provided for students, and they ran away with the construction of the box. Wood needed to be cut to length, sanded on the edges, and nailed together. Students worked as a team and used problem-solving skills to create the box. Afterwards, it was moved outside to the place where it will stay while cafeteria waste is composted. Students were proud of their accomplishment and felt strongly about leaving their mark on it. Session six was spent painting the outside of the box; students decorated the compost box with their names and pictures or designs that represented them as individuals.

The seventh and final session of class was held with only about one week left in the school year. The students decided that instead of trying to start composting with so little time left, when they did not think there would be much student buy in or attention paid to the project, it would be a better use of their time to do some preparatory work to launch the project in the fall. Students conducted research on the Internet concerning what types of waste could go in the compost bin, and then created posters to help other students understand what to do. The posters will be hung on the wall near where students discard the waste from their lunches.

Analysis and Interpretation of NEP-C Data

Students completed a 10-item questionnaire both during the first session of the afterschool class as well as during the final interview session. The questionnaire is called the New Ecological Paradigm for Children (NEP-C), and it is used to analyze a child's attitudes towards the environment. The questionnaire uses a Likert scale from 1 to 5 to

represent a child's attitude, with 1 representing an attitude of strong disagreement and 5 representing an attitude of strong agreement. A copy of the NEP-C can be found in Appendix A.

Comprehensive changes in students' attitudes. Before examining each questionnaire item individually, it is essential to look at the student results in a comprehensive fashion. In order to do this to reflect overall changes in students' attitudes, a few adjustments were made. Items one, two, four, five, eight, and ten were scored just as the students scored themselves; these items can be interpreted as having a pro-environmental lens. Items three, six, seven, and nine, on the other hand, can be interpreted to have an anti-environmental lens.

Therefore, scores on the anti-environmental items have been reversed. When students scored themselves as a one, the score was altered to a five, and vise versa; when students scored themselves as a two, the score was altered to a four, and vise versa. Scores of three were left the same. Only participants who had pre-class and post-class surveys were included in this analysis, leaving one participant out due to a late start date. Here are the comprehensive scores for the NEP-C, both overall and for each individual participant:

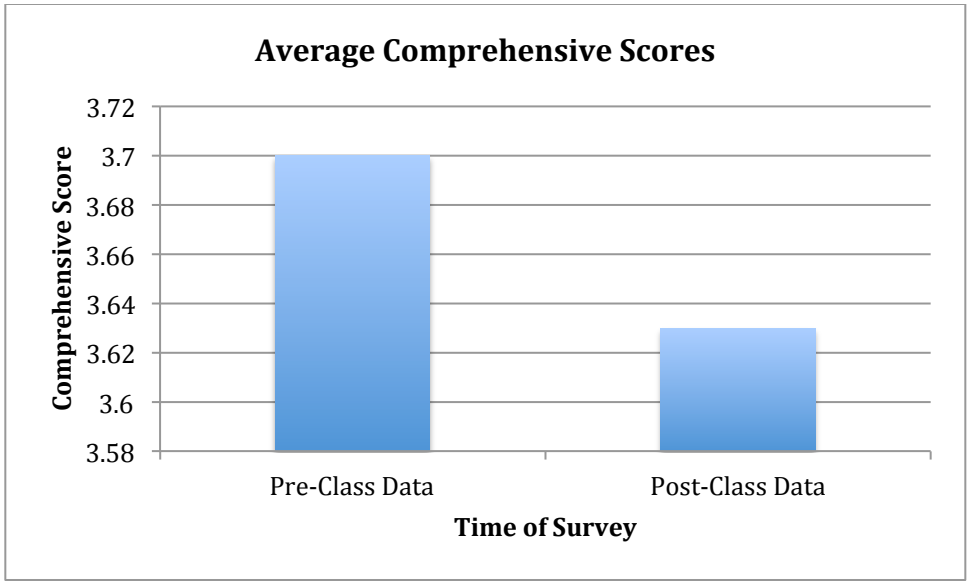

FIGURE 1: AVERAGE COMBINED COMPREHENSIVE SCORES ON NEP-C.

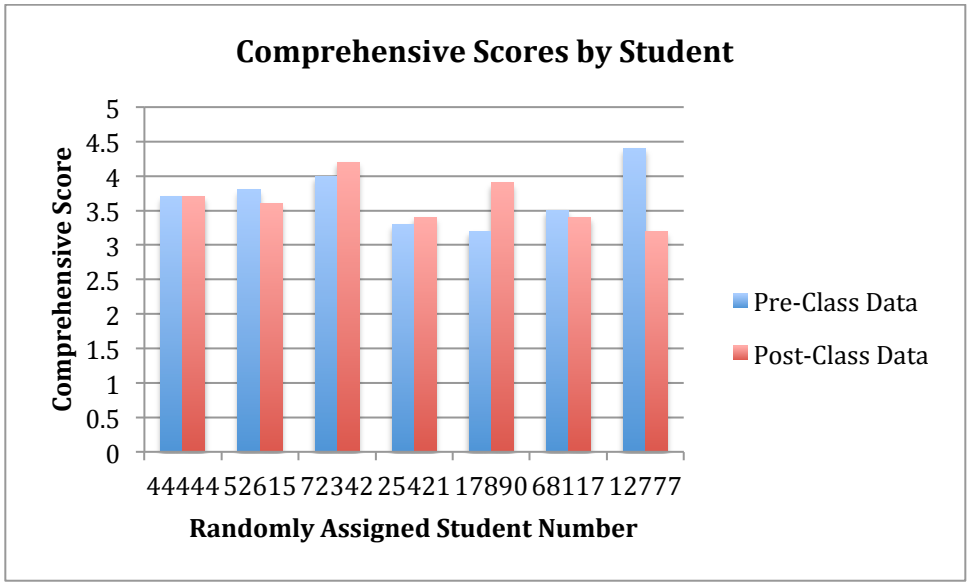

FIGURE 2: COMPREHENSIVE SCORES ON NEP-C BY PARTICIPANT.

Considering the entire group, with the adjusted scores, average scores dropped from 3.7 out of 5 to 3.63 out of 5; this is not considered to be a significant difference. Even examining the comprehensive scores by participant, there is only one student whose score

differed by more than one point: student 12777. As will be discussed later, the vagueness of some of the items on the NEP-C may have caused this student to interpret the items differently each time the questionnaire was completed.

It is also interesting to note that although the comprehensive scores for most students did not vary significantly, some students' scores did increase slightly while some students' scores decreased slightly. With the differences not being significant, it is hard to rationalize why not all students' scores responded in the same way to the knowledge and experiences gained in the afterschool class.

Item-by-item analysis and interpretation. Although the change for the entire group of participants was not significant on the NEP-C, it is still critical to analyze and interpret the data collected for each item on the questionnaire; each item on the questionnaire asks the respondent to consider different viewpoints and ideas about the environment, and it is helpful to examine each item for context. It is important to note that pre-class data will include seven data points while post-class data will include eight data points, as one participant joined later and did not take the initial questionnaire.

Item one analysis and interpretation. Item one on the NEP-C calls into question a student's attitude towards other living things in relation to humans: "Plants and animals have as much right as people to live" (NEP-C). Responses to this survey item are as follows:

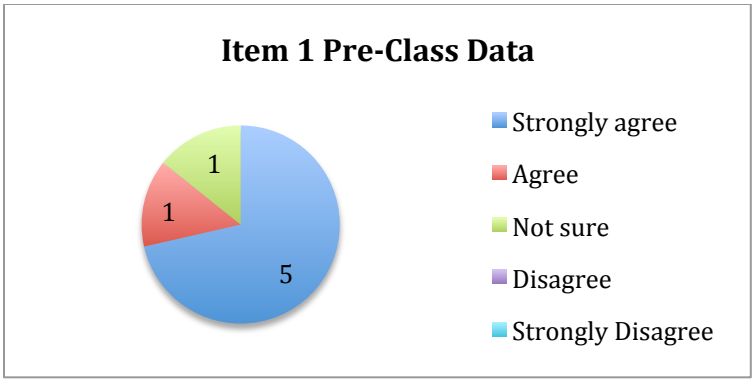

FIGURE 3: PARTICIPANT RESPONSES TO ITEM ONE ON NEP-C BEFORE CLASS.

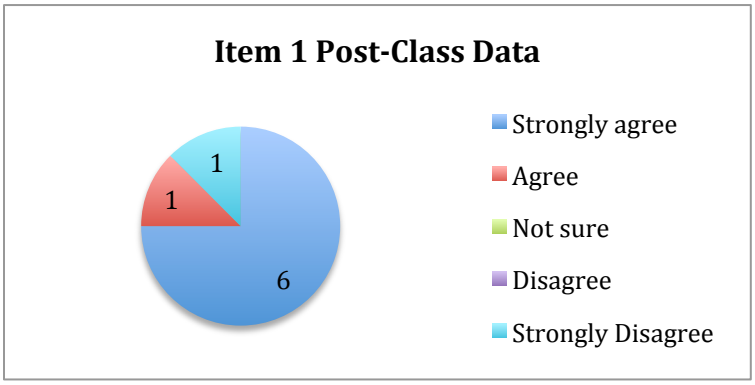

FIGURE 4: PARTICIPANT RESPONSES TO ITEM ONE ON NEP-C AFTER CLASS.

Overall, student attitudes towards other living things on earth, in comparison to humans, did not change significantly. Before the class started, students were mostly in agreement that other organisms on earth have a right to be here as much as humans do. This is unsurprising due to the fact that the participants in the study are highly empathetic students. The one interesting data point is the student who strongly disagreed with this statement at the end of the class; it should be questioned whether this particular student believes that these other organisms have more of a right to be on earth, less of a right to exist, or that the choice would be too difficult to make.

Item two analysis and interpretation. Item two on the NEP-C concerns human population and implies a negative impact on the rest of the earth: "There are too many (or almost too many) people on earth" (NEP-C). Responses to this survey item are as follows:

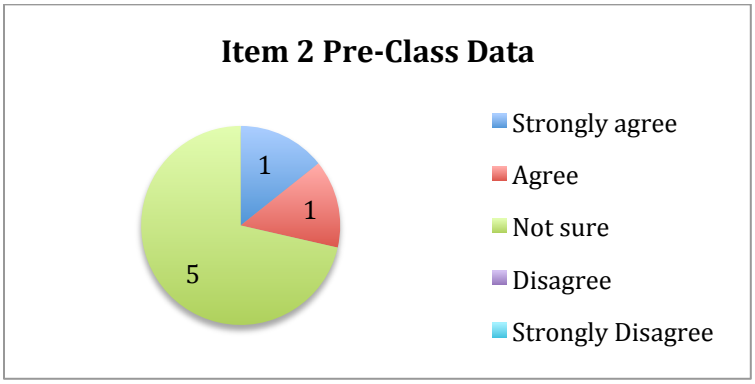

FIGURE 5: PARTICIPANT RESPONSES TO ITEM TWO ON NEP-C BEFORE CLASS.

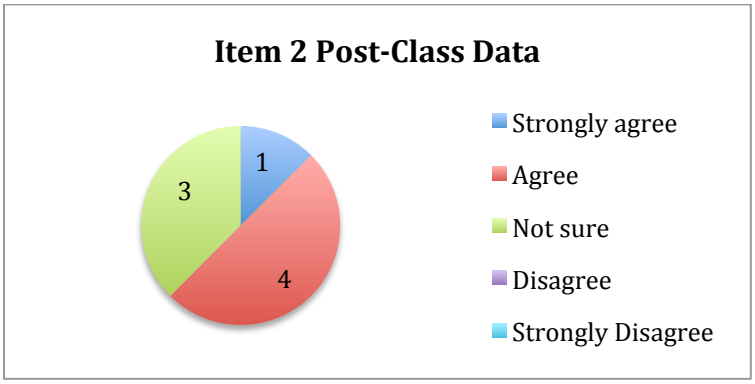

FIGURE 6: PARTICIPANT RESPONSES TO ITEM TWO ON NEP-C AFTER CLASS.

Student responses shifted from mostly being unsure about how to assess themselves to mostly agreeing that there are too many humans on earth. Seeing all the garbage on the short clean up walk in which students participated could have been the factor that moved these students to see on a bigger scale how humans treat the earth when there are so many of us here. The Waste Q&A could also be a contributing factor because many of the

questions were based on how much waste humans produce and where it goes when it has been disposed of, both properly and improperly. One hanging question is whether a more in depth examination of the trail of waste would have impacted these results more greatly.

Item three analysis and interpretation. Item three asks about human ingenuity in terms of not being harmful to the earth: "People are clever enough to keep from ruining earth" (NEP-C). Responses to this survey item are as follows:

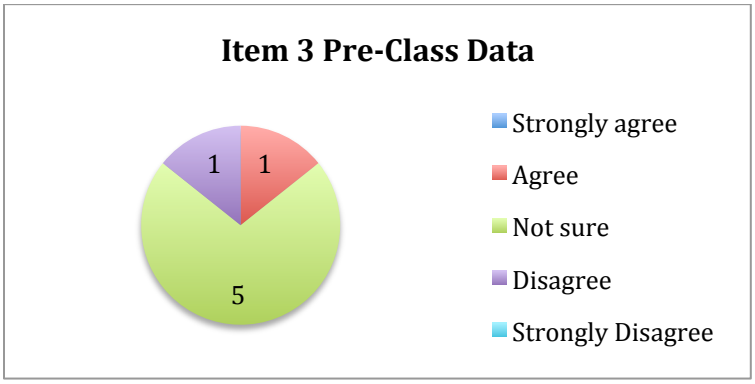

FIGURE 7: PARTICIPANT RESPONSES TO ITEM THREE ON NEP-C BEFORE CLASS.

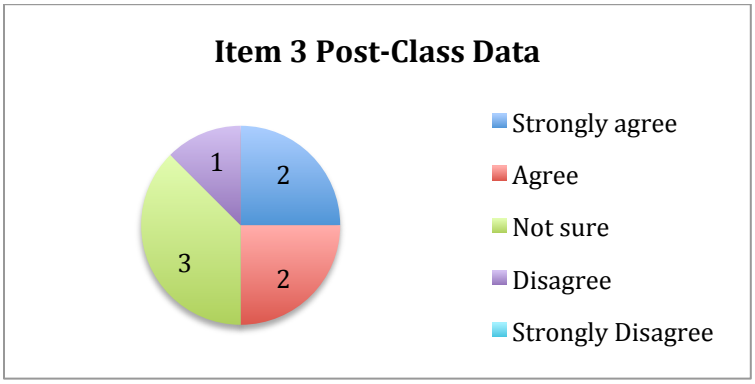

FIGURE 8: PARTICIPANT RESPONSES TO ITEM THREE ON NEP-C AFTER CLASS.

Prior to the class, students were mostly skeptical about whether or not humans have the intelligence and cleverness to not ruin the earth; after the class, there was still a

healthy amount of skepticism, although there was also more optimism regarding this statement. Constructing a composting box to be used at school next year is potentially one way that students may think humans are clever and are able to lessen their impact on their earth; also, taking action and implementing a clean up in the school community could have affected these results in a positive way.

Item four analysis and interpretation. "People must obey the laws of nature" (NEP-C). Item four on the NEP-C intends to clarify whether students believe humans are subject to the same laws and rules as the rest of nature. Responses to this survey item are as follows:

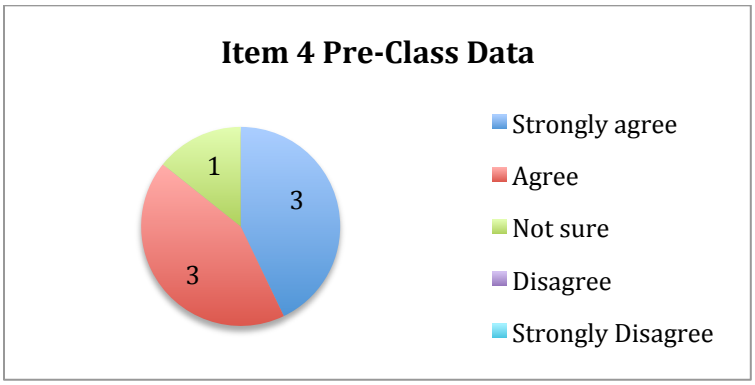

FIGURE 9: PARTICIPANT RESPONSES TO ITEM FOUR ON NEP-C BEFORE CLASS.

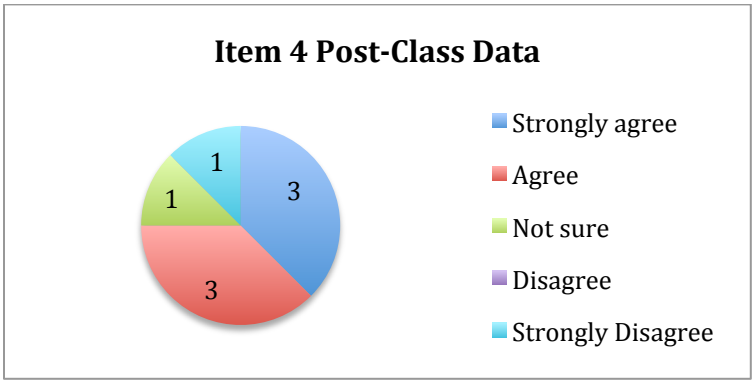

FIGURE 10: PARTICIPANT RESPONSES TO ITEM FOUR ON NEP-C AFTER CLASS.

Similar to item one on the survey, results did not change significantly. Also like item one, one student strongly disagreed with the statement while the majority of others agreed. It should be called into question whether this student truly believes humans have fewer rules of nature by which to live or more rules than other organisms. Also, it is possible that this student could believe that through innovation and creativity, humans can outsmart nature and not be subject to the same laws as other organisms.

Item five analysis and interpretation. Item five seems like a natural follow up to item four because it calls into question what happens when humans do not follow the laws of nature: "When people mess with nature, it has bad results" (NEP-C). Responses to this survey item are as follows:

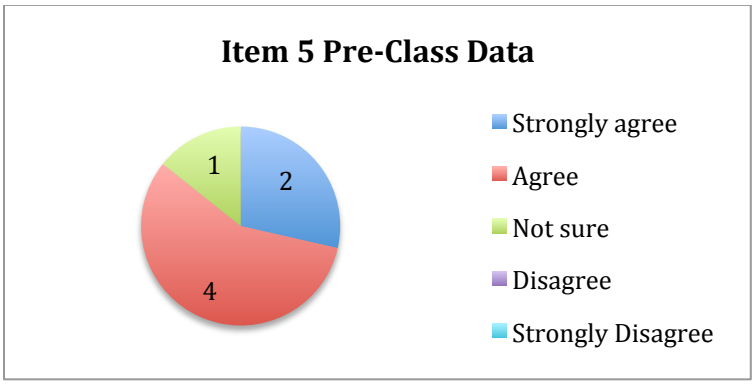

FIGURE 11: PARTICIPANT RESPONSES TO ITEM FIVE ON NEP-C BEFORE CLASS.

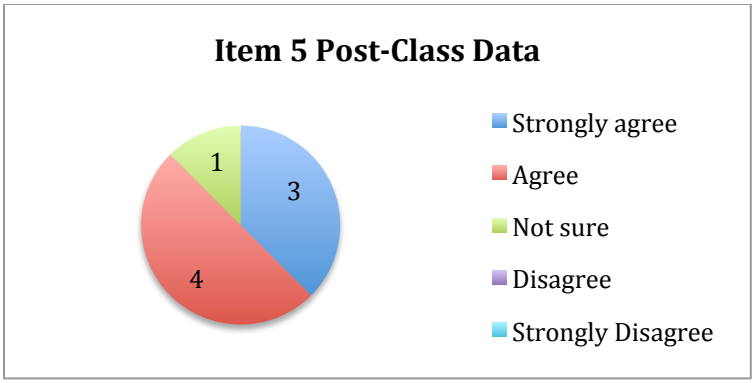

FIGURE 12: PARTICIPANT RESPONSES TO ITEM FIVE ON NEP-C AFTER CLASS.

There is no significant change between the student responses from the two questionnaires. Even though the participants in the class were not explicitly taught during the afterschool class about the consequences of human actions, the overwhelming majority of respondents believe that humans have a negative impact on the earth. In relation to item four, which concerns humans also having to follow the laws of nature and did not have a significant difference between the two questionnaires, it is not surprising that student responses did not vary much on this item either.

Item six analysis and interpretation. Item six is one of the items of the questionnaire to be inversely phrased, meaning that it takes the stance that what humans do to the earth does not matter. "Nature is strong enough to handle the bad effects of our modern lifestyles" (NEP-C). This item seems to be inquiring about something similar as item three: "People are clever enough to keep from ruining earth" (NEP-C). Responses to this survey item are as follows:

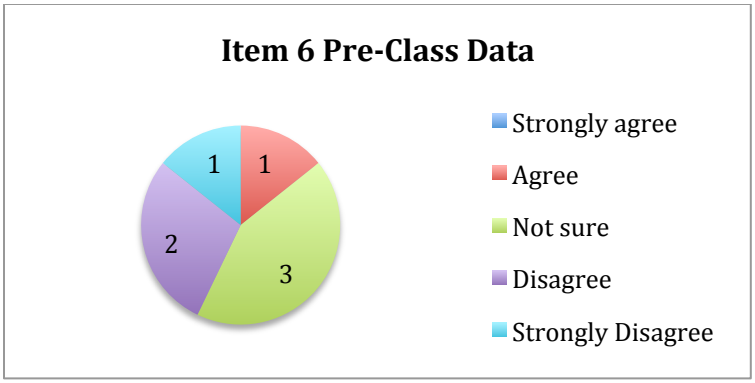

FIGURE 13: PARTICIPANT RESPONSES TO ITEM SIX ON NEP-C BEFORE CLASS.

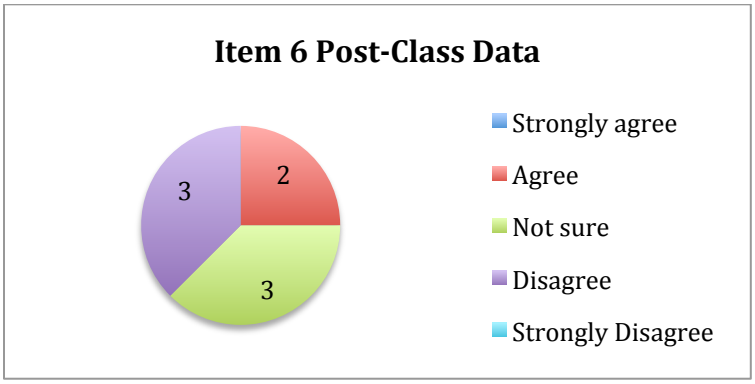

FIGURE 14: PARTICIPANT RESPONSES TO ITEM SIX ON NEP-C AFTER CLASS.

Being an item that is inversely phrased, the hope of the researcher is that student responses would move down the scale, unlike all other items discussed so far. However, students' responses did not change significantly. If anything, students seemed to believe that nature was able to handle humans' lifestyles more after the class. It is interesting to compare the results for this item to those of item three. In item three, there was more optimism about our ingenuity and cleverness after the class, but also lots of skepticism. Here, there is still much skepticism, but the negative impact of human actions seems to be viewed in a less severe manner.

Item seven analysis and interpretation. Item seven is also inversely phrased, placing the responsibility on nature to put up with humans' actions: "People are supposed to rule over the rest of nature" (NEP-C). Responses to this survey item are as follows:

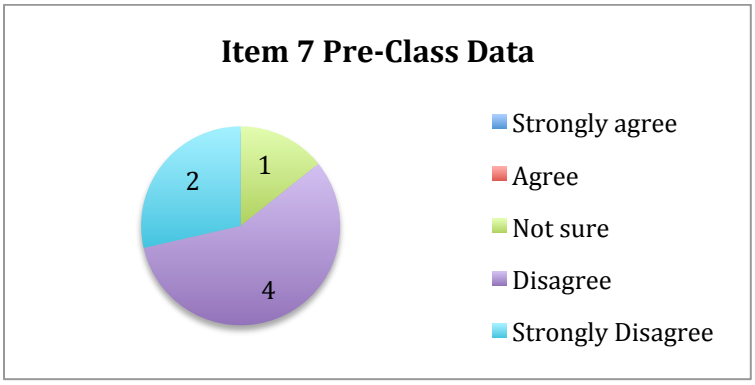

FIGURE 15: PARTICIPANT RESPONSES TO ITEM SEVEN ON NEP-C BEFORE CLASS.

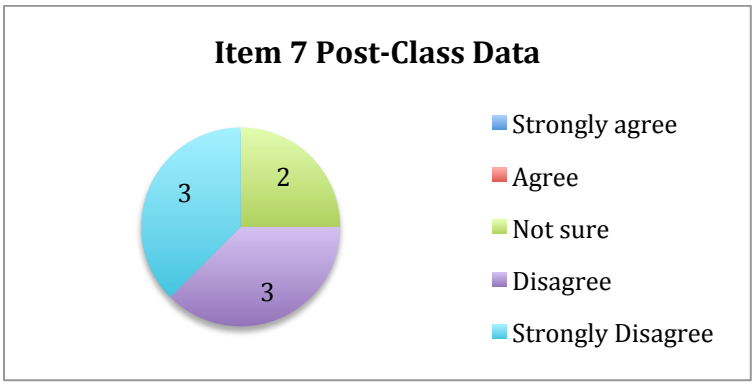

FIGURE 16: PARTICIPANT RESPONSES TO ITEM SEVEN ON NEP-C AFTER CLASS.

Responses to item seven did not change significantly over the course of the afterschool class. None of the students agreed or strongly disagreed before the class, and none of them did after the class either. This item has a strong connotation that humans should be able to use nature for whatever they please or desire. With many of the participants in the study being English Language Learners and coming from cultures

where the people are innately connected to the earth, it is not surprising that the responses reflect that culture.

Item eight analysis and interpretation. "People are treating nature badly" (NEP-C). Item eight returns to placing responsibility on humans for the state of nature and the earth. Responses to this survey item are as follows:

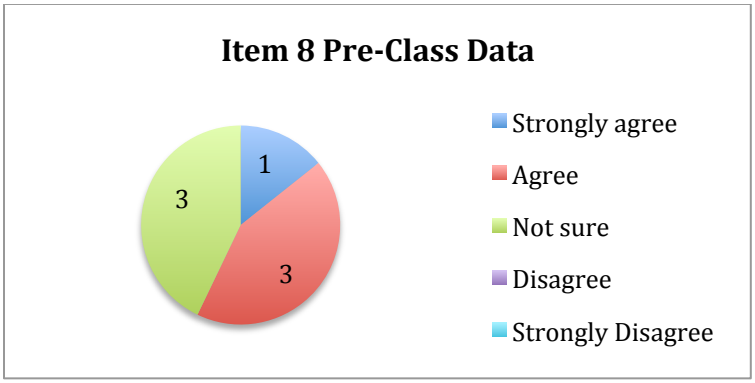

FIGURE 17: PARTICIPANT RESPONSES TO ITEM EIGHT ON NEP-C BEFORE CLASS.

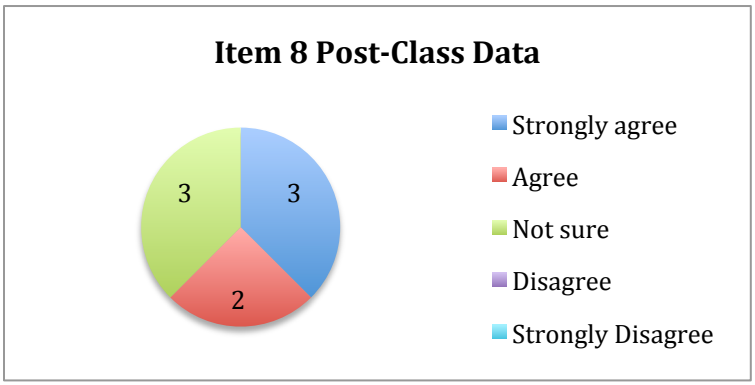

FIGURE 18: PARTICIPANT RESPONSES TO ITEM EIGHT ON NEP-C AFTER CLASS.

Students' attitudes about how poorly humans treat nature did not change significantly over the course of the study. The only difference that can be noted between the two data points is that their feelings became stronger that humans act in negative ways towards the earth. This item seems to suggest that students are exposed to many of the negative

behaviors and disasters that humans have imposed on the earth in the past or the ecological footprint of humans; students may have learned about these things in school or in their home lives. One question that cannot be answered by the data is how specific their knowledge is of environmental disasters and negatively impactful behaviors.

Item nine analysis and interpretation. Item nine is, once again, inversely phrased, meaning it is stated in a negative way: "People will someday know enough about how nature works to be able to control it" (NEP-C). This item attempts to connect human ingenuity with being capable of controlling the natural world. Responses to this survey item are as follows:

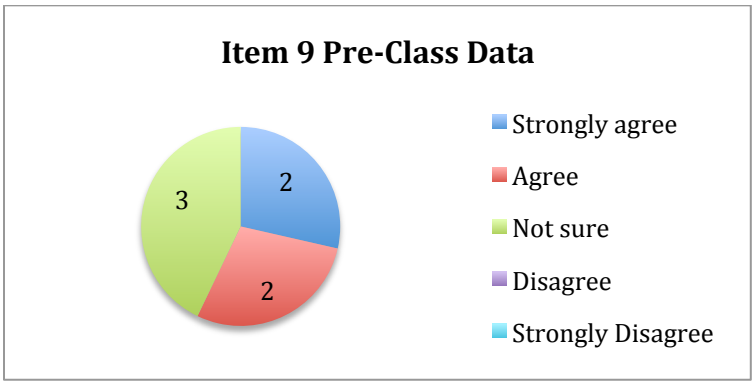

FIGURE 19: PARTICIPANT RESPONSES TO ITEM NINE ON NEP-C BEFORE CLASS.

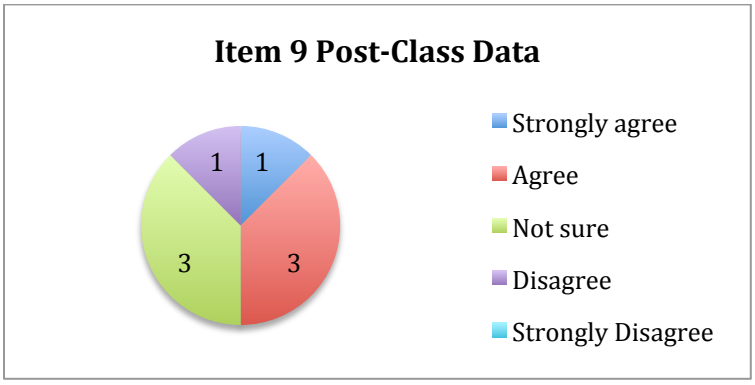

FIGURE 20: PARTICIPANT RESPONSES TO ITEM NINE ON NEP-C AFTER CLASS.

Once again, responses from the two data sets do not significantly differ. It is interesting to note that even though there is an implication here of humans ruling over the rest of nature by being able to take control of it, the majority of participants agree that this is possible. One feasible explanation for this belief is that the students see learning about composting as a waste management tool and preparing to implement it at school as controlling nature. Even though composting is a natural process, the way humans implement this practice is in a very controlled environment. This is potentially why students' responses seem to vary slightly in attitude from other items on the questionnaire.

Item ten analysis and interpretation. The final item on the student survey forces participants to look ahead to the future: "If things don't change, we will have a big disaster in the environment soon" (NEP-C). Responses to this survey item are as follows:

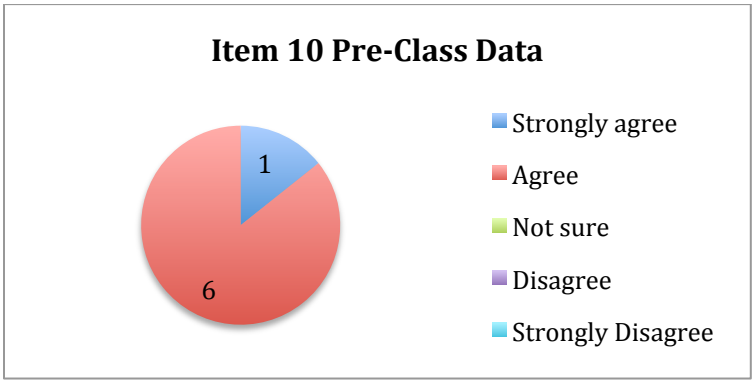

FIGURE 21: PARTICIPANT RESPONSES TO ITEM TEN ON NEP-C BEFORE CLASS.

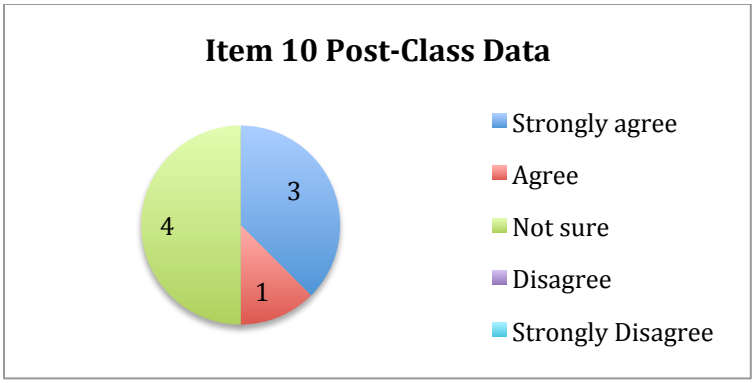

FIGURE 22: PARTICIPANT RESPONSES TO ITEM TEN ON NEP-C BEFORE CLASS.

Before the onset of the afterschool class, students seemed to be in agreement that humans were leading the natural world towards some sort of disaster. However, and quite surprisingly, there seems to be much more skepticism regarding the imminence of some sort of environmental disaster after the class. This was the most surprising item on the questionnaire. Students could potentially see humans as already making small changes, and, therefore, a gigantic environmental disaster could possibly be avoided. Also, it is possible that the environmental situation just does not seem as dire to these students as it does to many adults.

Analysis and Interpretation of Student Journals

Participants in the study were asked to write in a journal three separate times throughout the course of the study. Students wrote in their journals for the first time at the end of the second session, after participating in a clean up walk on school grounds and in the surrounding community. The second time students wrote in the journals was the fourth session of class, approximately two-thirds of the way through the creation and construction of the compost box. The third and final time students were asked to write in their journals was between the last class and their final interview with the researcher.

Students had lots of freedom when choosing what to write about in their journals, especially for the final entry. The purpose of having the students journal was to identify themes of what they found important and mentally or emotionally stimulating about the class. A list of prompts given to students to provoke thoughtful responses in their journals is included in Appendix C.

Student journals were examined for the themes and ideas listed on the table below. The list of themes and ideas was gathered before examining the journals, with a few being added as the journals were being read. The number of times each was mentioned or alluded to is recorded as well. A graphic representation of the data is also included as a comparative tool.

Themes and Ideas	**Times Mentioned**
Fun	12
Teamwork	0
Doing something new/different	3
Building/painting compost box	7
Learning	1
Helping the earth	13
Change in behaviors	0
Would participate again	9
Poster creation	8
Negative comments	5

TABLE 1: THEMES AND IDEAS IN STUDENT JOURNALS AND NUMBER OF TIMES MENTIONED.

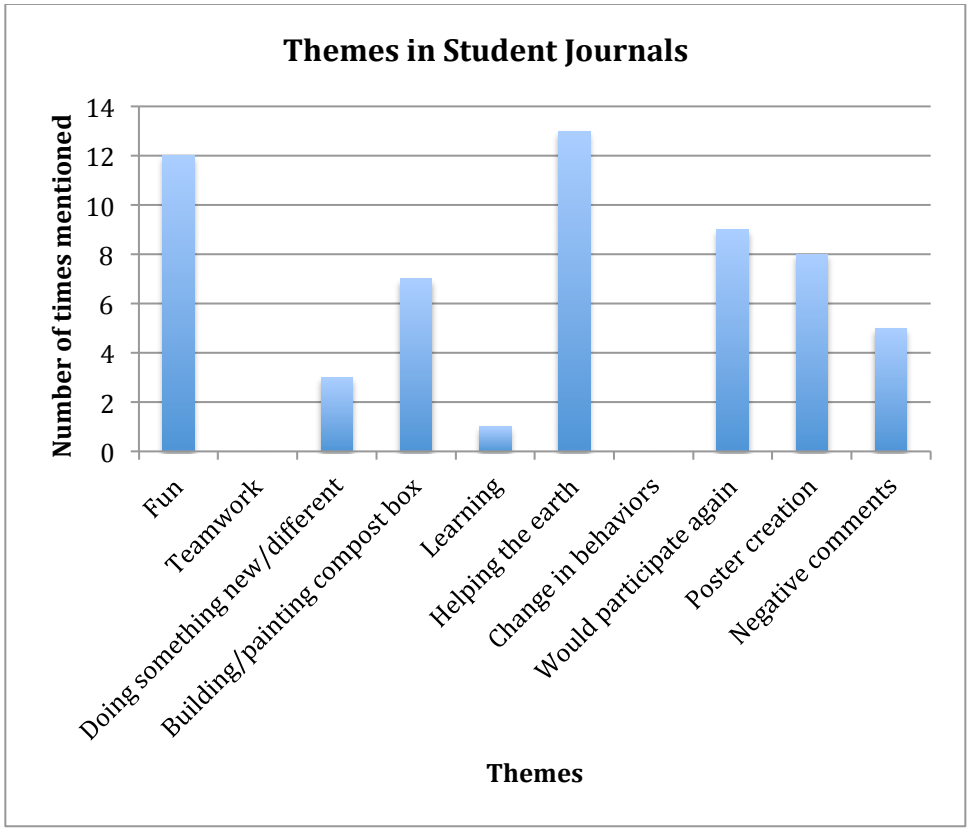

FIGURE 23: THEMES AND IDEAS IN STUDENT JOURNALS AND NUMBER OF TIMES MENTIONED.

The two themes or ideas that were mentioned the highest numbers of times are "fun" and "helping the earth". In much of the research from the literature review, "fun" was mentioned time and again as being important to a fulfilling experience in a service-learning project. Also, viewing the activities that students participated in during the afterschool class as "helping the earth" is validating; the students perceive these experiences as being beneficial to all living things, which was the main purpose behind this class. It was important that students saw that they could make small changes that could potentially change the whole system.

The two categories with the lowest numbers of mentions (zero) were “teamwork” and “change in behaviors”. “Teamwork” was viewed as an integral part of productive and relevant service learning projects in much of the research, and it is very surprising that it did not appear at all throughout any of the student journals. One possible explanation for this is that the school these students attend is a collaborative learning environment; perhaps working with other students to achieve a common goal is so second-nature to the participants that they don’t even notice they are engaging in the behavior.

“Change in behaviors” was the other category that did not receive any mentions in the students’ journals. This lack of references from the participants is not so surprising here. Much of the research surrounding transference of environmental behaviors from one place to another supports the idea that it is difficult to achieve, even with mature, well-informed adults. The purpose of this study was not to change student behaviors outside of school; it was to make a difference in the school setting. Also, it is worth mentioning that the main goal of this study was to introduce composting to a middle school setting; what the study actually accomplished was setting the stage and making the preparations to start this in the fall of the following school year.

Overall, the list of themes and ideas represented in the students’ journals were mostly predictable. There were few negative comments in comparison with the positive thoughts, which is a positive outcome of the class. It is also encouraging that being willing to participate again was mentioned a significant number of times. This piece of data can be interpreted as meaning that the participants are interested in moving the work

of the afterschool class forward and continuing down a path of gradual change for their school.

Analysis and Interpretation of Student Interviews

The final sources of data for this study were the eight individual interviews conducted by the researcher. After the final session of the afterschool class, students were asked to answer five questions in a short conversation with the researcher; a list of the five interview questions is included in Appendix D. The interviews happened during the regular school day. Each question will be discussed individually.

Question one analysis and interpretation. The first question asked students about their favorite part of the after school class, which we called Environmental Club. Building and designing the compost box was voted the favorite activity by six of the eight participants, while the other two participants chose the clean up walk on school grounds and in the surrounding community. Given that these were the two major activities that the students participated in, these results are not surprising.

When asked to explain why they chose that particular activity as their favorite, there were multiple answers. Four students mentioned that they liked the social aspect of the activity, both working with other people as well as being able to discuss their experiences as they were happening. Trying something new and helping nature were mentioned three times each, and doing something positive for the school was mentioned once. For many of these students, it was the first time they had ever held a hammer and pounded a nail into a piece of wood; for many of them, it was the first time they had explored the idea of

composting. For a few, it was the first time they had helped their community in a meaningful way.

Question two analysis and interpretation. Question two in each interview was focused on the clean up walk that students participated in during the second session; students were asked to describe how they felt after being involved in the walk. The most commonly mentioned idea was that they felt they were being helpful, not just to the community but to the earth and the other things that live on it; this was mentioned six times. It was validating to see that students understood the main reason for the walk – it wasn't for them, but for everything else.

Other ideas mentioned by students during the interviews are listed here, starting with the next most common idea and moving down the list: spending time in nature (three mentions), working with others/teamwork (two mentions), fun, pride, influencing the behavior of others, and surprise at how messy the protected areas were in relation to residential areas (one mention each). The main goal of the walk was to clean up the neighborhood, not to instill any one of these things in the participants. In order for environmental experiences to be meaningful, they have to be personal; the length of the list of responses here validates that point.

Question three analysis and interpretation. The third question in each of the interviews focused on the composting box. Students were given the chance to ask any questions that were still lingering for them. Also, since there was not an opportunity to actually begin the process in the spring, it was essential to give students time to reflect on where they thought the project would go in the fall of the following school year.

Only one student asked a question, and it was about the process of composting: how it works, if it works on its own or if it needs assistance from other living things. It was surprising that not more students asked about this, in fact, due to the fact that it was not discussed during the class. Any knowledge that students possessed about composting was of their own accord. It is a valid question that does need to be answered for educational purposes. It would not make sense to expect this behavior to ever begin to transfer to other environments in the students' lives without them possessing a clear understanding of how the process works and how it benefits the environment.

Regarding looking forward on the project, students had mixed feelings about how the process would unfold when presented to the entire student body. Although there was much optimism and hope for the project, five students mentioned they thought it would be difficult to get other students to buy in to the process. Ideas they had for making it easier for people who did not know as much to participate in the process were as follows: use the posters the students created as a guide, potentially make more posters and educational signs, provide a separate bin right in the cafeteria for compostable items, and also inform families that this was happening at school.

Question four analysis and interpretation. Question four asked students to reflect back on the afterschool class and consider any changes they would make for the future. Seven of the participants stated they wouldn't change anything. One student mentioned they wished more people had joined. Given that, in the past five years, there have not been any environmental groups at school for students to join, it is not surprising that they would

not change anything. Students were content doing something to help the earth because, in their eyes, doing something is better than doing nothing.

Question five analysis and interpretation. The final question of each interview asked students to reflect on their life outside of school; specifically, if there were any changes or adjustments that they had made as a result of participating in the afterschool class. Two behaviors were mentioned three times each: being more conscious of whether or not something is recyclable and also not littering. The following list of behaviors each received one mention from students: picking up other people's litter, repurposing items instead of throwing them away, being more conscious of electricity usage, and beginning to recycle at home.

As small as each of these behaviors may seem, each is a small step in the right direction for students as they continue to find their place in the world. For these middle school students, even being conscious that they create waste is a feat that should be positively acknowledged. Creating behavior change is one of the hardest things to accomplish with humans because we are creatures of habit. The fact that these middle school students can acknowledge the little changes they are making in their own lives is validating in its own right.

Triangulation of the Three Data Sources

The most difficult part of analyzing data from different sources is combining it all into a meaningful set of conclusions. Although the data set is limited to eight, female middle school students from the same urban-suburban middle school in the upper Midwest, there

are some conclusions that can be drawn if the three sources of data are examined in conjunction with one another.

The first of these conclusions is that changing attitudes about someone's ability to positively impact the environment takes as much greater amount of time than the study allowed. The data from the NEP-C as well as the students' responses both in the journals and the interviews demonstrate that little to no change in attitude occurred for these eight participants. As disappointing as this might seem, the activities in which the students participated can be considered small-scale actions; it is sometimes hard to see the larger-scale impact of these actions without time and resources.

Secondly, having students lead the way on an environmental journey is crucial for success. In this study, students were in charge of the agenda as well as the direction of the class from the first session onwards. According to student journals and interviews, students felt a sense of pride in helping the earth by creating this compost box. Students had fun designing, building, and decorating the box to make a lasting impact at their school. Even though they suspect the road ahead is a difficult one, most participants said they would participate again, given the opportunity.

The final conclusion that can be drawn from the data is no matter how small the changes in students' attitudes may seem, they are optimistic and willing to do the work necessary to make a change in their world. Even though the changes in behavior that students listed in their individual interviews were small-scale actions, and the data from the NEP-C showed insignificant changes in behaviors for most participants, it is important to acknowledge that there were changes, no matter how slight. It is essential to

acknowledge, as well, that the locus of control for middle school students is a tiny circle; the adults who surround these students make most of the decisions regarding the students' lives for them. The fact that any changes appeared at all is no small feat and should not be ignored.

Summary

In chapter four, the results for the study concerning the following research question were discussed: how does composting at school change the way middle school students perceive their ability to positively impact the earth? The setting and participants in the study were briefly discussed, as well as the weekly activities that the students participated in throughout the after school class. The three sources of data for this study, the New Ecological Paradigm for Children survey, student journals, and individual interviews, were analyzed and interpreted, both individually and collectively. The following chapter will discuss limitations and implications of the study, along with a personal reflection from the researcher.

CHAPTER FIVE

Conclusions

Introduction

Any research study that is conducted should always be scrutinized for limitations and qualifications for the findings that are presented. Also, a solid investigation into any research question will often produce more questions than it does answers. The research question investigated in this capstone is: how does composting at school change the way middle school students perceive their ability to positively impact the earth?

In this final chapter, the limitations of this particular research study will be discussed. Also, questions that have arisen as a result of the study will be contemplated. Since the initial end goal of this capstone was not met, per say, next steps for continuing the work started by the participants of the study will be considered. Finally, a personal reflection from the researcher is included.

Limitations of the Study

The most obvious limitation of this research study is the extremely small sample size from which all data was drawn. Since the participants had to elect to be a part of the environmental club that was the keystone of the study, I knew going into this project that the data collected would be skewed due to the small group. As with any data with a

sample size this tiny, it is difficult to make any large conclusions about the shifts in attitude and behavior of the students. A larger participant group would have provided much clearer data and allowed for more valid conclusions to be drawn.

The second limitation of the study is that 75% of the participants in the study are classified as English Language Learners (ELLs) by the school district. Students are identified as ELLs based on varying levels of English proficiency. Being an ELL student does not necessarily mean they have immigrated to the United States from another country; oftentimes, students who are identified as ELLs speak a language other than English at home, making their English acquisition more lengthy than students who only speak English.

ELLs bring many different cultures and worldviews to the table, which helps to create a rich learning environment for everyone in the classroom, including the instructor. However, many ELLs also need extra processing time when being questioned, depending on their individual level of English proficiency. This may have affected the way students responded in their journals or in their individual interviews. Having a more representative mix of students with regards to ELLs and non-ELLs would have provided a much more accurate depiction of a typical middle school.

Another limitation is the gender identity of the students who participated in the study – 100% of the participants identify as females. It was very surprising to me that no males at school decided to join the club. There are many reasons why this may have happened; first, while the afterschool class was in session, there were many other opportunities for students after school, including athletics, homework help, and various other afterschool

classes. Secondly, there was no real formal invitation for students to join the class. Signs were posted in the hallways around the school, and I made an announcement to each of my five classes about one week before we started.

If we consider the last two limitations discussed, the high percentages of ELLs as well as females, what it truly boils down to is that the participants in the study were not a representative sample of a typical middle school; they are not even a representative sample of the middle school they attend. When considering attempting a similar project in another school, the results could vary dramatically based on the student population that opts to participate.

One final limitation to this study that should be mentioned is the short time frame in which the study was conducted. Students met as a group for seven ninety-minute sessions over the course of eight weeks; this makes a total of only ten and a half hours of meeting time. If there had been more sessions and more time, we could potentially have started the composting process at school this spring. This was the original goal of the study, but with so little time, it was not a feasible outcome.

Future Steps to Further the Study

Originally, the plan for the study was to begin composting at school. With such little time available in which to conduct the study, this turned out not to be an attainable goal. However, all is not lost. With lots of the preparatory work completed in order to begin composting at school, our group's work will continue this fall. The girls who participated in the study did an amazing job of kick-starting this work, and hopefully, as they

indicated in their journals and interviews, they are still on board to continue working towards our goal in the fall.

To really begin this process at school, there will be some education needed, both in the classroom as well as in the cafeteria. It is unclear whether the adults in the building know what types of waste are compostable; before we can begin bringing students along on this journey, there needs to be some buy in and education for the adults in the building. It's unclear what this education looks like right now, but some type of adult learning is essential for success. If the learning was student-led, I believe it will have more impact than if the learning were led by myself or other adults in the building.

Once the adults are clear about compostable and non-compostable items, it will be much easier to educate the students; administration and cafeteria workers will most likely be the forefront of the education piece, helping students make decisions about what kinds of waste goes where in the cafeteria. I foresee some resistance from students because they will ask things like "who cares where I throw my garbage?" or "why should I even think about this?" I truly believe once we are able to get these students to see the bigger picture, this will be quite a successful venture.

One possible complication as the project moves forward will be space. So far, there is only one compost box, the dimensions of which are three feet high, tall, and wide. If the project is as successful as it hopefully can be, that compost bin will fill up quickly. More bins will be needed in the future; this then becomes a question of time and resources to build the boxes. There are many possible sources of funding in the world, some of which include grants as well as donations from Internet fundraising sources.

Reflective Thoughts

Overall, the data collected and analyzed in this study agrees with the ideas compiled in the literature review. There are no glaring differences, though possibly there are some small discrepancies that can be accounted for by the difference in groups studied. Concerning adolescent ecological identity, all of my students come from distinctly different backgrounds than one another. This further demonstrates the idea that there is no single set of character traits that make a person more likely or less likely to be an advocate for the environment. Also, each of my students has their own connection to nature, making this experience and all other environmental experiences they will have unique to themselves. This is the beauty of ecological identity – everybody's is just a bit different from everyone else's.

It is my belief that the challenges of environmental education were more apparent after organizing this after school class. I am more skeptical than I was before starting this journey that we as educators will ever come to a consensus on a definition; I do not believe that a consensus about what is most important to teach will be reached either. Although I would consider my project with these students successful in the sense that they want to continue the work, teaching environmentally friendly behaviors without historical context has its limitations. My mind is still searching for a realistic answer to this question: what truly is environmental education?

The research surrounding service learning proved to be some of the most useful for me as a researcher throughout this journey. I had never led a service-learning project before, and the characteristics of successful projects were so relevant. Having students

lead the way with their vision and their passion turned out to be one of the most important things about it. It is now more apparent how difficult it would be to sustain doing this type of learning long-term if the financial resources were not available. It's also important to remember that these students were volunteering their afterschool time to participate in this project. As much as volunteering is necessary to creating caring individuals, many things in someone's home life can easily distract or prevent someone from participating, no matter how much their heart desires it.

I was not expecting the time to be a limiting factor in this study. It was disappointing that the students did not get to experience the start of a compost bin because that was the initial end goal of this project. However, all of the students in the Environmental Club will be able to return to school next year to help sell this idea about sustainability to the rest of the student body. The sense of pride that these students feel about their hard work creating the box and starting to do something new and different and helpful for the environment gives me hope that this project will continue to move in the right direction.

Moving forward, I will continue to run Environmental Club as long as students are interested, even if there are only a few participants. This is a different type of club than has existed at our school in the time I have worked there, and it is important work for the future. The students will continue to be the brainpower for the direction of the group because that is such an important part of keeping students engaged. These students are going to be leaders in their own worlds someday, and it is essential that we help support an environmental lens in their lives.

Summary

In conclusion, this journey has been so meaningful and fulfilling for me. Even though this study has a number of limitations, namely in regards to the sample size of the data collected and the demographics of the participants, I would consider this to be a successful project, both personally and for the school community. I have high hopes that the project will continue in coming years, starting with educating the people at school about composting and how beneficial it can be for the environment. Hopefully this is not where my work ends – the students will lead the way into the future of this club with their own passions and interests. Much of the research that was done in preparation for the study was validated in some way, although some pieces were more positive and some were not as promising. The work my students and I have done here is important, and it will continue to be important in the future, both for them and for our world.

APPENDIX A

Letter of Consent

April 12th, 2016

Dear Parent or Guardian,

I am your child's TOPS class instructor and a graduate student working on an advanced degree in environmental education at Hamline University, Saint Paul, Minnesota. As part of my graduate work, I plan to conduct research in my after school class from April 12 to May 31, 2016. The purpose of this letter is to ask your permission for your child to take part in my research.

I want to study how composting at school affects how students perceive their ability to have a positive impact on the environment. Through this service learning opportunity, students will learn about different waste management techniques and start a composting program at [redacted]. Students may participate in a field trip to a local landfill, as well as learning about alternate waste management methods. Students will construct containers to be used at [redacted] for a new composting plan.

There is little to no risk for your child to participate. All results will be confidential and anonymous. I will not record information about individual students, such as their names, nor report identifying information or characteristics in the capstone. Participation is voluntary and you may decide at any time and without negative consequences that information about your child will not be included in the capstone.

I have received approval for my study from the School of Education at Hamline University and from the principal of [redacted], [redacted]. The capstone will be catalogued in Hamline's Bush Library Digital Commons, a searchable electronic repository. My results might also be included in an article for publication in a professional journal or in a report at a professional conference. In all cases, your child's identity and participation in this study will be confidential.

If you agree that your child may participate, keep this page. Fill out the duplicate agreement to participate on page three and return to me by mail or attach a copy of the form in an email to me no later than May 1, 2016.

If you have any questions, please email or call me at school.

Sincerely,
Katie Pangborn
[redacted]

Informed Consent to Participate in Qualitative and Quantitative Data Collection

Keep this full page for your records

I have received your letter about the study you plan to conduct in which you will be leading an after school class based around the idea of composting at school. I understand there is little to no risk involved for my child, that his/her identity and confidentiality will be protected, and that I or my child may withdraw from the study at any time.

_____ _____

Parent/Guardian Signature Date

Participant Copy

Informed Consent to Participate in Qualitative and Quantitative Data Collection

Return this portion to Ms. Pangborn

I have received your letter about the study you plan to conduct in which you will be leading an after school class based around the idea of composting at school. I understand there is little to no risk involved for my child, that his/her identity and confidentiality will be protected, and that I or my child may withdraw from the study at any time.

_____ _____

Parent/Guardian Signature Date

Researcher Copy

APPENDIX B

New Ecological Paradigm for Children

(NEP-C)

New Ecological Paradigm for Children (NEP-C)

Name: _____ Grade: _____ Age: _____

For each item listed below, rank yourself according to the following scale:

1 = Strongly disagree

2 = Disagree

3 = Not sure

4 = Agree

5 = Strongly agree

Statements	My Rating
1. Plants and animals have as much right as people to live.	
2. There are too many (or almost too many) people on earth.	
3. People are clever enough to keep from ruining earth.	
4. People must obey the laws of nature.	
5. When people mess with nature, it has bad results.	
6. Nature is strong enough to handle the bad effects of our modern lifestyles.	
7. People are supposed to rule over the rest of nature.	
8. People are treating nature badly.	
9. People will someday know enough about how nature works to be able to control it.	
10. If things don't change, we will have a big disaster in the environment soon.	

APPENDIX C

Student Journal Prompts

- What are your thoughts about the activities you participated in today?
- What did you like about today's activities?
- What did you dislike about today's activities?
- Do you think today's activities will have any impact on your life? Describe why or why not.
- What surprised you about today's activities?
- What questions do you still have regarding today's activities?
- How do you think today's activities will impact your life?
- What connections do today's activities have to your life?
- What did you learn from today's activities?

APPENDIX D

Student Interview Questions

- What was your favorite thing about environmental club?
- Thinking about the clean up walk, how did you feel afterwards?
- Composting – what questions are you left with about it? What do you think will happen next year when we try to get this started in the cafeteria?
- Is there anything you would change about Environmental Club?
- Have any of your behaviors changed, either at school or in your personal life, in regards to your waste?

APPENDIX E

Waste Q & A

Waste Q & A

1. If every country consumed and threw away at the rate Americans do, how many planets' worth of resources would be required to meet the demand?
    a. 4
    b. 5
    c. 6
    d. 7

2. America is home to 4% of the world's children. What percentage of the world's toys do Americans buy and throw away?
    a. 40%
    b. 50%
    c. 60%
    d. 70%

3. How many plastic water bottles do American throw away every second?
    a. 494
    b. 594
    c. 694
    d. 794

4. How much food do Americans throw in the trash every year?
    a. 91 billion pounds
    b. 96 billion pounds
    c. 101 billion pounds
    d. 106 billion pounds

5. How many people could be fed with 5% of that wasted food?
    a. 100,000 people
    b. 400,000 people
    c. 1,000,000 people
    d. 4,000,000 people

6. How many of your food dollars are spent on packaging?
    a. $1 out of every $5
    b. $1 out of every $7
    c. $1 out of every $11
    d. $1 out of every $15

7. How much waste does the entire U.S. economy create to make a year's worth of food, fuel, resource extraction and products for one American?
    a. About 100 pounds of waste
    b. About 1,000 pounds of waste
    c. About 10,000 pounds of waste
    d. About 1,000,000 pounds of waste

8. How much of that total waste figure is recycled?
    a. 2%
    b. 5%
    c. 10%
    d. 25%

9. How much energy is wasted on junk mail?
    a. One day's worth could heat 10 homes.
    b. One day's worth could heat 1,000 homes.
    c. One day's worth could heat 150,000 homes.
    d. One day's worth could heat 250,000 homes.

10. How much of your life is spent on opening and throwing away junk mail?
    a. 8 minutes
    b. 8 hours
    c. 8 days
    d. 8 months

11. How many barrels of oil are used to make a year's worth of disposable plastic beverage bottles for Americans?
    a. 4 million
    b. 17 million
    c. 25 million
    d. 49 million

12. How many liters of water are needed to make one liter of bottled water?

a. 1 liter
b. 2 liters
c. 3 liters
d. 10 liters

13. How much disposable plastic wrap is made each year in America?

a. Enough to shrink wrap a school
b. Enough to shrink wrap a city
c. Enough to shrink wrap a state
d. Enough to shrink wrap a country

14. How many non-recyclable Styrofoam cups do Americans throw away in a year?

a. 10 billion
b. 25 billion
c. 50 billion
d. 100 billion

15. How much plastic trash ends up in the ocean?

a. 5.6 million tons
b. 10.3 million tons
c. 23.5 million tons
d. 64.2 million tons

Note: Answers to each question are bolded here for the reader. Student copies had no bold type.

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