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HOW DOES AN ENVIRONMENTAL BASED SERVICE-LEARNING
PROJECT IN AN NON-SCIENCE CLASSROOM AFFECT STUDENT'S
VALUES AND MOTIVATE THEM TO BE BETTER STEWARDS?

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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 2017

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CHAPTER ONE

Opening

I grew up exploring the outdoors. My positive outdoor experiences I had as a child influenced me to be a good environmental steward. Today I make eco-friendly decisions as a consumer, vote based on environmental stances, and try to limit my environmental footprint. My teaching career is influenced by my belief in sustainability and stewardship as well. I attempt to include environmental education in my social studies curriculum as much as possible and regret that I cannot incorporate it more. I want to expose students to today's major environmental issues, especially those students that did not have the same outdoor opportunities as myself, and teach them how these issues are relevant. Unfortunately, sometimes there is a misconception that environmental issues are insignificant and they are disregarded. These environmental concerns should not be limited just to science classes or environmental programs. My desire to expose non-science students to environmental issues and provide them with a meaningful experience has led to my research question: *how does an environmental based service-learning project in an non-science based classroom affect student's values and motivate them to be better stewards?*

Chapter one will show my environmental journey from a child immersed in outdoor activities to an adult living in a large, urban area, and how these opportunities have shaped my philosophy and played a role in my career. I will share my passion to motivate students to get involved with environmental issues and my decision to connect students to these concerns using service-learning projects.

Personal Journey

I developed my passion for the environment from spending most of my childhood outdoors. Growing up I was not allowed to watch tv or play video games indoors. Instead, I explored the local woods and streams with only my imagination. I feel lucky to have had access to water and land as a child. Our cabin in central Wisconsin was a cherished second home for me. I built forts, chopped wood, caught bugs and explored aimlessly for hours. My parents gave me the freedom to explore their 40 acres of land with only the lunch I had packed that morning. My father also brought me up hunting and fishing, and while there are differing opinions and perceptions of anglers and hunters today, these opportunities played an important role in teaching me about conservation. It forced me to wade through marshes, sit silently in woods for hours and get lost in deep forests. These experiences taught me that the environment is a special place that should be cherished and protected.

After I graduated from the University of Wisconsin Eau Claire I moved to the Twin Cities in Minnesota to teach social studies at a nearby middle school. The new job and location forced me to spend less time outdoors. Urban parks and running paths were my new way of getting fresh air and tying myself to the outdoors. My environmental philosophy evolved and I no longer saw cities as environmental barren places. I learned that urban areas have many environmental opportunities and needs. They also have unique environmental concerns that can directly affect city dweller's health and their community. Air and water quality, access to green space, city infrastructure and even crime are tied to the environmental decisions that city leaders make (Russ, 2015). I

learned that these decisions influence social issues, especially those related to low socioeconomic minorities.

After 10 years of teaching I enrolled in the Natural Science and Environmental Education Graduate Program at Hamline University. The students in the program are wonderfully passionate about the environment and I thoroughly enjoy being surrounded by these like-minded individuals. However, I cannot help but notice that the program attracts a rather homogenous group. Many students have similar backgrounds that include a childhood entrenched in outdoor experiences like my own. Our common environmental values seem to originate in the outdoor opportunities many of us were lucky to have growing up. I began to wonder why there was not more diversity within the NSEE program.

My graduate work taught me about urban environmental education. The focus of urban environmental education is to get students from urban areas to work hands-on with the environment and to make the material as relevant as possible to their lives. This is the first time I heard of an environmental education program focusing on urban areas. Even though most people live in cities, many environmental education programs are designed to take kids away from their community and immerse them in a new outdoor experience. The idea is simple; students are going to buy in more if teachers can connect environmental issues to their experience of living in or near a large city.

Currently I teach world history and AVID at a south metro high school; AVID (Advancement Via Individual Determination) is a college prep program aimed at historically underrepresented students. I do include some environmental education in my social studies curriculum, typically drawing comparisons from a modern day issue with a

similar problem in the past. The Industrial Revolution is a great example that allows me to explore current issues like pollution and health. However, even when I do have an opportunity to discuss environmental issues with my social studies classes, I rush through them and do not get to explore the nuances that are needed. More importantly students are never given an opportunity in my current social studies class to problem solve these environmental concerns. I realized that there was opportunity in my two AVID sections to finally get a chance to talk about some major environmental issues and to empower students to make a difference through an environmental themed service-learning project.

Environmental Motivation

I struggle with understanding what motivates some people to act, but not others. My social studies classes discuss why in recent presidential elections 40 to 50 percent of voters do not turn out to vote in the United States (Robertson, 2016). It seems like such an easy task with large consequences, yet many Americans are not motivated enough to act. I often hear my students argue that one vote does not really make much of a difference anyways. I believe many people hold the same argument when it comes to the environment. We are plagued with many environmental issues like ocean dead zones, urban pollution and climate change. These issues are too important to be ignored but mass amounts of people are doing just that. Maybe they do not know where to start, or maybe they feel like they cannot make a difference. It is also possible that they have not been exposed to many of these topics and do not realize there are problems to address.

I know there are ways to motivate people to make eco-friendly decisions and get involved in environmental issues. Over the summer I toured the Xcel Center in St. Paul to better understand how they were able to motivate people to recycle. The Xcel Center

takes great pride in being a green entertainment venue, recycling 66 percent of their trash in 2015 (Xcel Energy Center, 2016). They learned through research, and trial and error, that people want to recycle, but are only motivated if they do not have to sacrifice too much. The Xcel Center discovered that making it easy for their guests to recycle by limiting how far they needed to walk would get them better results, and now patrons can find recycle bins scattered everywhere in their facility. Understanding the psychology behind motivation is vital for me to get my students to be better stewards.

My main goal is to motivate my students to make an environmental difference. Motivating a diverse group of students that may not have a lot of outdoor experiences in a non-science based class is a challenge. Some of my students view the outdoors as a scary place and do not place high value on it. I do not have the ability to take students on a life changing weeklong trip outdoors to teach them differently. Instead, I want to show them how environmental issues affect them in areas like nutrition, access to green space, traffic congestion, gentrification and many more social issues. Even though my students mostly live in a suburb, many have a similar relationship with the outdoors as students that live in urban areas. My objective is to use the urban environmental education philosophy to develop students by giving them opportunities to get directly involved in their community with an environmental based service-learning project of their choice. Besides bringing awareness to these important issues, a service-learning project has the added benefit of teaching them problem-solving skills, critical thinking and leadership (Beachman, Maahs-Fladung & McFadden, 2009).

Service- Learning Projects

There is a large push within education to get kids engaged in service-learning projects (Tugend, 2010). The idea is to get students involved in their communities while

at the same time develop leadership, collaboration and critical thinking skills. Students need tools to successfully solve real world problems in their community (Russ, 2015). The high school I teach at includes an academic program in our ninth grade civics curriculum called “genius hour”. This curriculum gives students the chance to develop a service-learning project based on local, or national concerns. It also has the benefit of teaching students about democratic citizenship. The high school I teach at is currently considering merging this curriculum with our STEM programming and expanding into our tenth grade. The idea would change our current school calendar in order to open up time for students to work independently on a community topic of their choice. The students would use teachers from various content areas to help them complete and present their work. This large initiative requires a pilot program and demonstrates how our learning community values service-learning projects.

The AVID program requires that students get involved in the community. In the past we accomplished this by requiring students to volunteer eight hours per trimester. Most students reached this goal, but their volunteering experiences were not noteworthy to colleges and did not seem to connect with the community or any one cause. Replacing volunteering with a more in depth focus on an environmental service-learning project will allow students to make a larger impact, teach others about their concerns, and hopefully motivate them continue to work on environmental issues going forward. Hopefully, the new service-learning curriculum will also teach my students important life skills and allow them to stand out amongst their peers in the college application process.

My AVID students will be doing their service-learning projects on an environmental theme of their choice. I want this process to expose them to new issues

and hopefully motivate them to be lifelong stewards. Completing an environmental service-learning project within a science based elective class, or with students that have strong feelings about the outdoors, might be more successful than my non-science class. I know that many of my AVID students have not had the same opportunities as me to experience the outdoors growing up. These are the students that need to be reached with environmental education. Environmental issues involving natural resources, health and climate change are some of the most concerning of our time and we need to provide all students with a chance to get involved and try to solve them. My question looks at how we can motivate students with little outdoor experience.

Summary

My childhood was full of rich, meaningful outdoor experiences that shaped my future and inspired me to be environmentally active. My high school AVID students might not have had similar outdoor opportunities or experiences and may lack the desire to solve important environmental issues. They need to be shown the relevancy of these topics and empowered to bring awareness. The best way to accomplish this goal is through an in-depth service-learning project in my AVID 10 classroom. This capstone will examine how much this environmental based service-learning project will affect their values and motivate them to be better stewards. The service-learning project will also teach students lifelong skills like leadership and allow them to collaborate with others to problem solve real life issues. Their completed project will motivate them to be better environmental stewards and hopefully help them in their college admissions process.

CHAPTER TWO

Review of Literature

Introduction

The world's population is growing and will be at nine billion people by the middle of this century, up two billion people from the early 1900s (Goleman, Bennett & Barlow, 2012). We are running out of resources like clean water and are on the fringe of doing irreversible damage to our ecosystem, especially on issues of climate change, ocean acidification, clean water, and land use (Goleman, Bennett & Barlow, 2012). Over the past century, environmental education (EE) has evolved to address these ever important and changing issues but clearly these environmental concerns are not just limited to the science classroom. Other content areas like history and literature need to be working interdisciplinary with environmental education to reach as many students as possible, and show that perhaps these issues should be addressed unilaterally, and not just 'owned' by science. Most importantly, students need to learn that they do not have to be a bystander to these environmental issues, and that they can make a difference in our environmental future.

Motivating students to be environmental stewards and changing their group norms is a goal of EE. The question is whether curriculum in a non-science class like AVID can successfully motivate students. Environmental education understands the importance of getting students to work directly with the environment and with their local community, *but how does an environmental based service-learning project in a non-science based classroom affect student's values and motivate them to be better stewards?* The existing literature provides some answers to these questions.

There are five major topic areas that require in depth analysis: history and trends of EE, environmental attitudes, motivational psychology, service-learning, and an explanation of the AVID program. The first section will provide an overview of environmental education, urban EE, and ecoliteracy so the reader better understands the foundation of environmental education. The second section will focus on adolescent attitudes towards the environment. This literature will analyze the importance of environmental attitudes and whether they can be changed. The third section will focus on the psychology of motivating people and changing their behavior to be more pro-environmental. The fourth section will examine the role and outcomes service-learning projects have in our schools, and specifically how they apply to environmental education. Finally, the last section will explore the AVID (Advancement Via Individual Determination) program.

Background and Trends of Environmental Education

Environmental education has transformed throughout history to become an international matter with an increased presence in today's schools. EE sprang forth from enlightenment ideas like Jacques Rousseau, who "...called for returning to nature and discovering information rather than memorizing facts about science" (p. 10) and originally focused on nature study, outdoor education and conservation (Krasny & Monroe, 2015). In the early 20th century, environmental education focused around nature study "...emphasizing the observation of nature while in the outdoors and through exploration of the relationships of plants, animals, and the physical systems that support them" (Krasny & Monroe, 2015, p. 11). This early educational model was done in reaction to urbanization that was occurring around the turn of the century. People were

beginning to move off farms and into cities, and educators' goals wanted to keep us connected to the environment (Krasny & Monroe, 2015). Population grew in the following decades, and still more people moved to the cities; environmental education shifted to conservation. The goal was "...to increase awareness about conservation issues, espouse the importance of wise use of natural resources, and encourage the public to understand and comply with environmental laws" (Krasny and Monroe, 2015, p. 12). Finally in the 1970s, EE grew into an international issue. The United Nations governing body UNESCO (United Nations Educational, Scientific, and Cultural Organization) declared that EE was vital for younger generations and played an active role in officially defining Environmental Education as:

the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality. (Krasny & Monroe, 2015, p. 7)

In 1972, the International Environmental Education Programme was formed and by 1975 they defined the international goal for EE as having

...a world population that is aware of, and concerned about, the environment and its associated problems and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. (McBride, Brewer, Berkowitz & Borrie, 2013, p. 5)

In 1977, UNESCO held an intergovernmental meeting in Tbilisi, Georgia to help define the role of environmental education. The resulting declaration, known as the Tbilisi report, gave environmental education a clearer definition and focused its goal on educating learners to help solve major environmental issues (as cited in Hungerford, 2010). These international declarations began to filter into environmental education programs in the United States. Educators focused on achieving the international goals by focusing on “awareness, knowledge, concern for the environment, and skills” (Chawal & Cushing, 2007, p.437). Environmental education at this time focused mostly on endangered species and recycling (Krasny & Monroe, 2015). By the 1980s, the focus shifted to sustainability and development. In 1987, the international report *Our Common Future* demonstrated the need to develop sustainably and responsibly in order to maintain a healthy environment (Santone, 2014).

Environmental Education still focuses on sustainability and ecoliteracy in the twenty first century. Literacy is typically associated with being able to read, but was first tied to the environment when an author for the 1960’s magazine *Massachusetts Audubon* asked ““how shall we know the environmentally literate citizen”” (McBride, Brewer, Berkowitz & Borrie, 2013, p. 3). The 1977 Tbilisi Declaration defined environmental literacy as having “awareness, knowledge, and ability to take action” (as cited in Krasny and Monroe, 2015, p.8). Recently, however, “environmental literacy” has focused on ecoliteracy (McBride, Brewer, Berkowitz & Borrie, 2013). Ecoliteracy is having the ability to understand how our ecosystems work and using that understanding to promote further sustainability (McBride, Brewer, Berkowitz & Borrie, 2013.) Ecoliteracy requires one “to understand how nature sustains life” (p. 7) and “...requires the capacity for

systems thinking, or the ability to perceive how the different aspects of a living system exist, both in relationship to one another and relative to the whole that is greater than its parts” (Goleman, Bennett & Barlow, 2012, p. 7). Someone that is ecoliterate is “...prepared to be an effective member of sustainable society, with well-rounded abilities of head, heart, hands, and spirit, comprising an organic understanding of the world and participatory action within and with the environment” (McBride, Brewer, Berkowitz & Borrie, 2013, p. 14). An ecoliterate individual understands that their lifestyle choices have environmental consequences. They do their best to minimize the damage they cause to the ecosystem and promote sustainable behavior.

There has been an ongoing debate within environmental education about whether the main goal is to educate and teach skills, or to drive behavioral change (Krasny & Monroe, 2015). Many believe that the key component of ecoliteracy and environmental education must contain environmental action. The *Center for Ecoliteracy*, a organization dedicated to teaching sustainability by providing resources and promoting school initiatives, has helped drive this idea by creating curriculum that focuses on leadership and cooperation through working on such issues as community gardens, school lunches, land preservation, and “integration of sustainability into teaching and learning” (Goleman, Bennett and Barlow, 2012, p. 6). Many educators assume incorrectly that environmental action is a natural consequence of education (Kollmuss & Agyeman, 2010). However, this is not the case, and as a result many environmental educators are designing specific curriculum to motivate students to act.

Over time, environmental education has had to remain flexible and respond to change. The long history of environmental education has allowed it to adapt quite well to

economic and political changes (Krasny and Monroe, 2015). Budgets for environmental education will always fluctuate, as will political will and pedagogical methodology.

According to Monroe and Krasny (2015), the focus of EE has shifted to include urban settings and sustainability. This shift follows a huge demographic change in the past century. People have moved from rural to urban areas and by the year 2050, 80 percent of people will live in urban areas (Russ, 2015). EE adapted to this change and a new trend within environmental education is focusing on urban environmental education.

The basic goal of urban EE is no different from most environmental education programs in non-urban areas. Many educators in urban EE "...want to improve environmental literacy among students, or foster positive youth development...." (Russ, 2015, p. 12) However, urban EE addresses the misconception that cities are not "natural" and that in order to actually appreciate the environment, one has to leave the city (Russ, 2015). Urban EE models focus on working with students in the city in which they live and not removing them from the area they know the best. According to "Urban Environmental Education" (Russ, 2015) there are five major trends in urban EE. Most of these trends focus on getting kids working hands-on with the environment, whether it is visiting local green spaces, water treatment facilities, or solar power companies. The goal of many of the trends is to be relevant as possible to student's lives. Many EE leaders believe that minorities and city dwellers do not value environmental education and want to engage urban residents by focusing on relevant issues like nutrition, pollution, traffic, and even social issues to improve their community (Russ, 2015). Overall, the trends focus on using urban EE to develop students by teaching them problem solving skills, critical

thinking and self esteem, or they focus on solving community issues, stewardship and designing a city to better use resources and space.

Throughout its history, environmental education has focused on increasing students environmental knowledge, changing their environmental values and motivating them to act. This study examines whether a mandated environmental service-learning project can be a successful tool to accomplishing these goals of environmental education. The next section will examine how environmental attitudes develop, how this attitude is affected by demographics, and whether or not environmental attitudes drive behavior.

Changing Environmental Attitudes

Another goal of EE, besides education and encouraging action, is aimed at changing environmental attitudes and motivating people to be better stewards. It is important to understand how environmental attitudes develop and change. Attitudes are “...the enduring positive or negative feeling about some person, object or issue” (Kollmuss & Agyeman, 2010, p. 252). Environmental attitudes develop in children at a young age “...and by the time they reach adolescence they have acquired a sufficient level of understanding of environmental issues, such as ecology, sustainable development, economics and technology, to be able to formulate their own views on these issues” (Lyons, 1994, p. 224). Many studies consistently demonstrate that by adolescence, environmental attitudes dip to a low point compared to other ages (Olsson & Gericke, 2016, p. 37). This attitude dip amongst adolescents, however, does not apply to social and economic issues like sustainability, poverty, and gender issues (Olsson & Gericke, 2016, p. 37). Teenagers seem to be more inspired by social issues than specific environmental concerns.

Environmental attitudes seem to be affected by demographics. Older, middle, and upper class people are more likely to be concerned about the environment than younger, lower class citizens (Lyons & Breakwell, 1994, p. 226). However, there seems to be no consistent research on whether men or women tend to be more environmentally concerned (Lyons & Breakwell, 1994, p. 227). It appears that "...[w]omen usually have a less extensive knowledge than men but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change" (Kollmaus, 2010, p. 248). While demographic data is a decent starting point, it is not always reliable in predicting environmental attitudes by itself.

There are other factors besides demographics that affect a person's environmental attitude. Where people live influences their environmental attitude as well. Overall, people living in urban areas tend to be more environmentally concerned than those that live in rural places (Lyons & Breakwell, 1994, p. 227). It is unclear how religious views affect environmental attitudes. There are mixed results that show "spiritual growth" and meditation does drive some people to make an environmental difference (Bramston, 2010, p. 785). Other factors that may influence someone's environmental attitude are childhood experiences, family values, and role models (Kollmuss & Agyeman, 2010, p. 251).

A person's environmental attitude does not necessarily correlate to their environmental action. The assumption that environmental knowledge leads to an attitude shift and eventual pro-environment action is not true (Kollmuss & Agyeman, 2010). The gap between attitude and action depends on family customs, social norms, and the level of direct experience a person has had with an environmental concern (Kollmuss &

Agyeman, 2010). A person's environmental attitude does not directly correlate to their environmental action; “attitudes do not determine behavior directly, rather they influence behavioral intentions which in turn shape our actions” (Kollmuss & Agyeman, 2010, p. 242). People with a pro-environment attitude want to feel good about their actions but are limited by how much they want to change in lifestyle. As a result, people are often only willing to make small behavioral changes that cost little money or take little time. Unfortunately, many pro-environmental people tend to choose the behaviors with the “least cost” (Kollmaus, 2010, p. 252).

There is also a gap between an individual’s environmental knowledge and their environmental action (Kollmuss & Agyeman, 2010), which many studies have researched. While many environmental education programs are still following this 1970s idea that more education will lead to more action, there has been little evidence to support it (Kollmuss & Agyeman, 2010, p. 241). Many people with a high understanding of science believe that technology will be able to “...conquer nature and solve any environmental problems....” (Lyons & Breakwell, 1994, p. 225). These individuals are less motivated to change their behaviors because they believe that science will solve the problem instead.

The goal of this study is to measure any change in students environmental values as a result of an environmental service-learning project. This last section addressed the importance of understanding how environmental attitudes develop, how they compare amongst different demographics, and how closely they are tied to environmental action. The next section will further address the gap between environmental knowledge and environmental action.

Environmental Psychology and Motivation

The growing field of environmental psychology begins to address environmental challenges by looking at motivation and human behavior (Clayton, Devine & Swim, 2016, p. 2). Human behavior plays a large role in environmental issues that stem from human consumption and population growth issues (Clayton, Devine & Swim, 2016, p.2). Humans sometimes do not recognize that the cause of environmental harm is their own actions. Studying “[p]sychology offers clues as to why people engage in unsustainable behaviors despite their concern about the broader consequence” (Manning, 2009, p. 3). The field of psychology provides a unique perspective on environmental action and sheds some light on why some people are motivated to act while others are just bystanders.

Motivating people to act pro-environment is complex and includes many factors. Motivation around environmental stewardship is associated with ego, altruism, and the idea of “protecting life” (Bramston, 2010, p. 778). People that are motivated by ego are concerned about how the environment will protect their health and future, while those that are altruistic are motivated by doing what is best for the community (Bramston, 2010). Volunteering in the community and being part of a social group plays a critical role in motivating people to help the environment (Bramston, 2010, p. 784). In one research study, this was one of the strongest motivating factors (Bramston, 2010). The same study reported that believing one is making a difference by doing something worthwhile, and may be helping future generations, also scored high in their research results (Bramston, 2010). Externally motivated people may not act pro-environment because their “...altruistic and social values, are often covered up by the more immediate, select motives, which evolve around one’s own needs (e.g. being comfortable, saving

money and time)” (Kollmuss & Agyeman, 2010, p. 250). Further, the factors that motivate someone to act are complex and change overtime (Bramston, 2010). This means that while people who may be extrinsically motivated to help clean up habitat space early in life, could be the same people who become intrinsically motivated to help future generations after they experience life change themselves, like having children of their own.

Psychologists have been criticized for studying more short-term behavioral change than long term (Clayton, Devine & Swim, 2016, p. 9). Short-term change is helpful to the environment, but long-term value shifts are the end goal. Some human behaviors that psychologist are studying “...are deeply culturally and structurally entrenched, which makes them difficult to change” (Clayton, Devine & Swim, 2016, p. 10). Psychologists believe that our brains are wired to act quickly to threats like a car coming at you, but struggle to respond to “slow-moving threats” like climate change (Harman, 2014, p.2). Psychologists also believe that there are two separate brain systems that may affect humans acting rationally: a conscious “rule based system” and a unconscious associate system (Manning, 2009, p.3). It is this associate system that may influence our daily decisions and override the logical part of the brain (Manning, 2009). This is why pro-environmental people may make short-term decisions that benefit them more, but may not be good for the environment, such as driving to work or flying often to other countries. Psychology also helps explain why some people that are well educated about environmental issues do not always change their lifestyles in a more pro-environmental way: our behavior is complicated and cannot be explained by a single model.

But the field of psychology also proposes some good solutions to help people change their behavior and be better stewards. Environmental programs need to appeal to a person's emotions and show them how it relates to them, as well as allow for an easy pathway for people to take action (Manning, 2009). This might be achieved by focusing on local issues, setting attainable goals, and encouraging people to make small changes that can become a habit (Manning, 2009). People may be willing to change their behavior, but might not do so because they have not persisted enough to make it a habit (Kollmuss & Agyeman, 2010).

Psychology helps explain the circumstances surrounding human's positive effect on the environment. There are issues of extrinsic and intrinsic motivation that change over time. There is also the question of ego, like environmental stewardship, or altruism, like community building, and how that interplays with motivation (Bramston, 2010). Humans tend to struggle with slow moving threats, but this fact can be mitigated by extreme passion for the environment (Harman, 2014). This may be helpful in understanding high school students, a group that places emotional importance more broadly in their life.

Students are motivated to act when they believe that an environmental issue is important and when the required action requires only a small lifestyle change (Manning, 2009). Hopefully, over time these small actions will lead to new habits and a more sustainable lifestyle. Students need to be exposed to different environmental issues and allowed to choose what they think is important. Thus, service-learning projects are great opportunities to get students involved in environmental action.

Service-Learning Projects

There is a growing interest in connecting students to their community through service-learning. Many high schools and colleges around the nation require that students participate in a service-learning project before they graduate. Service-learning is a “...teaching and learning method that connects meaningful community service with academic learning, personal growth, and civic responsibility” (Dominguez & McDonald, 2005, p. 2). The difference between service-learning and community volunteering is that service-learning requires more than just your time. Service-learning projects are a process in which students choose a specific issue that is important to them and their community and attempt to solve it, typically with the aid of a teacher or adult community member. Often, service-learning projects are tied to a school curriculum and state standards. These projects can be a powerful way to connect students to their community and allow them take on important social and environmental concerns. A North Carolina teacher summarized an experience completing a service-learning project with a group of AVID students as “ [f]or perhaps the first time in their academic career, my students can see the relevancy of what we are teaching to their personal lives” (Beachman, Maahs-Fladung & McFadden, 2009, p. 9).

There are many benefits to having students complete a service-learning project. They allow students to connect to their community, improve their self-esteem, help them develop communication skills, and increase their social skills by working with adults (Beachman, Maahs-Fladung & McFadden, 2009, p. 3). Completing a project often requires students to write letters to community leaders, present their ideas and reflect on their actions. Students engaged in service-learning projects “... are calling upon a variety

of academic and practical skills related to their growth and development as active, engaged citizens” (Kesson & Oyler, 1999, p. 144). Students are forced to use skills and content from many different subject areas. A group of students in Oklahoma realized that during their service-learning project that they “...engaged with literature, chemistry, anatomy, zoology, environmental science, local history, geology, poetry, journalism, civics and government, business skills, and economics” (Kesson & Oyler, 1999, p. 147). Developing these real life skills gives students the confidence to take on large projects and encourages civic engagement, the desire to makes one's community a better place. Service-learning projects connect students to an issue and goes beyond the type of volunteerism that is completed just for students to pad their college resumes. Colleges admission officers prefer to see students take an active role in a complex service-learning project than just log hours of “insincere” volunteering with “minimal commitment” (Tugend, 2010).

There are a few problems with service-learning projects. Unsuccessful projects may demonstrate that change is difficult to achieve and leave students disheartened. A survey of North Carolina AVID students showed that their attitudes changed in regards to how much impact they believed they have on community problems from a pre-service-learning project score of 97.2% to a post of 60.2% (Beachman, Maahs-Fladung & McFadden, 2009, pp. 7-8). Organizing and completing a service-learning project takes a lot of work and forces some students outside of their comfort zone. Students may not anticipate how much work and time goes into a service-learning project and become fearful of taking on a project again. Another survey result from the same North Carolina students showed that more students believed after they completed the project that they

have too many responsibilities in their life to take time to help others (Beachman, Maahs-Fladung & McFadden, 2009, p.7-8).

The final concern with service-learning projects is making sure the project coordinator is politically neutral. It is clear that “teachers have a special responsibility to negotiate carefully among their own political beliefs and commitments and their public responsibility to foster a comprehensive and fair analysis of issues” (Kesson & Oyler, 1999, p. 148). Teachers need to understand their biases and remain politically neutral while leading student service-learning projects.

There is some debate around whether mandated (assigned) service-learning is as beneficial as voluntary service-learning. Proponents of mandating service-learning believe that it increases civic engagement and fulfills the common mission of providing volunteering opportunities to all students, many who would not have the opportunity otherwise (Kackar-Cam & Schmidt, 2014, pp. 86-87). Research shows that there is little beneficial difference in regards to the benefits the community receives and the social networks students create between those that choose to volunteer and those that were mandated to complete a requirement (Kackar-Cam & Schmidt, 2014, p. 87). A study of 19 high schools in California showed that all forms of volunteering, whether it was required or not, benefited student’s “civic activity” as long as it had some classroom learning attached to it (Tugend, 2010). Opponents of requiring service-learning argued that students may miss out on the benefits of volunteering because they are not intrinsically motivated and are just trying to get a good grade (Kackar-Cam & Schmidt, 2014, p. 87). According to Alina Tugend (2010) of the New York Times, “...if teenagers — and adults for that matter — are thrust in a volunteer situation they don’t understand

or feel that they are simply being assigned made-up work, it can actually have a detrimental effect”.

Service-learning projects fit in naturally with EE curriculum. Allowing students to get hands-on with an environmental issue and drive change not only teaches students about the environment, but also creates passion for an issue and teaches the skills to solve those problems. Cross disciplinary and thematic projects, like an EE service-learning project in a non-science classroom, gives students the freedom to pose new questions, problem solve and is “... geared towards [students] taking meaningful action in the world” (Kesson & Oyler, 1999, p. 140). Integrating curriculum around a specific environmental theme allows students the chance to dive deep into a topic and understand the nuanced process and red tape that normally surrounds solving some of our most vital environmental issues. It “...organizes student learning around topics of vital relevance to the students themselves-instead of around the textbook (Kesson & Oyler, 1999, p. 147). Environmental issues like climate change and sustainability can be overwhelming and may lead to students “...disassociating themselves from the natural world” (Dominguez & McDonald, 2005, p. 2). Service-learning projects have the ability to accomplish the goals of the 1978 Tbilisi conference to “increase awareness and knowledge, building skills for taking action, allowing opportunities for participation in resolving environmental problems, and affecting attitudes, resulting in increased stewardship of the environment” (Dominguez & McDonald, 2005, p. 2). While many teachers provide instruction and content, service-learning projects are a great way to increase skills and get hands on (Dominguez & McDonald, 2005).

This research study is focused on measuring the effects of a mandated environmental service-learning project on student values within a AVID 10 classroom. While much of the literature supports using a service-learning project to help engage students with a topic like the environment, not many studies focus specifically on service-learning projects and environmental values. The next section of the literature review will explain more about the AVID 10 program.

AVID

Service-learning projects are one component of the AVID (Advancement Via Individual Determination) educational program, a growing international program designed to get underrepresented students into college. The AVID program began 35 years ago when, Mary Catherine Swanson, an experienced teacher responded to the changing demographics of her Californian school district by adopting new teaching strategies that focused on study habits, community and rigor (Rorie, 2007). Her goal was to design a system that worked for all her students, especially the minority students that were beginning to comprise a larger demographic of her high school's student body. While completing research in her graduate program, Mary Swanson identified specific skills that could help all of her students be successful in her classroom. The resulting program focused on students taking control of their academic choices, taught them to effectively take Cornell notes, placed them in rigorous, college- tracked coursework, worked on their reading and writing skills, and helped them form a tight community of support that they can rely on (AVID Website, 2016). What began in a California classroom decades ago has now expanded to 1.5 million students worldwide today (AVID Website, 2016).

The AVID program focuses on getting typically underrepresented, academic middle students into college through the use of a common, research-based curriculum. Many public schools have joined the trend of using pre-packaged curriculum programs like AVID because the programs help school administrators avoid forcing a possibly unpopular school initiative on their staff, and because the programs appeal to parents that are seeking more choice when selecting schools (Rorie, 2007). The AVID program is unique amongst other packaged educational programs because it intentionally focuses on students in the academic middle (Rorie, 2007). Many other academic programs focus on at-risk or high achieving students, but sometimes kids in the middle, kids that are so close to seeing success, are lost amongst other school initiatives (Rorie, 2007). Besides targeting students in the academic middle, another main goal of AVID is to include students of color, low-income students, and students that would be the first in their family to apply for college. The AVID program believes "...that when high student standards are upheld and academic and social support is provided, students will excel" (Franklin, 2011). While teachers from all content areas can be trained to use the AVID program within their area of expertise, the highlight of the program is the AVID elective class. This class is taken within a student's regular scheduled school day and teaches students how to stay organized, take notes, think critically, write, and successfully work with their school community (Avid Website, 2016).

While there are some mixed results about the AVID program, most studies demonstrate its success. One small study of AVID high school students showed no significant difference between AVID and non-AVID students in regards to their standardized math, reading and ACT test scores (Rorie, 2007). However, that same study

showed that AVID students outperformed their non-AVID peers in regards to their GPA, and were enrolled in more AP or IB coursework (Rorie, 2007). AVID's goal to work with minority and other underrepresented groups has helped "de-track" many of these groups that are typically "tracked" into less rigorous courses (Pugh, 2015). Many of these AVID students would never have entered into a college level IB or AP course if it was not for the AVID program's requirements. As a result, AVID students are three percent more likely to go into a college and seven percent more likely to stay into their second year of college than their non-AVID peers (AVID Website, 2016). AVID is having success with a demographic of students that are typically underrepresented at colleges. Not only does the AVID program make it more likely these underserved students will get into college but it teaches them skills that make it more likely that they will be successful once there (Franklin, 2011).

One of the AVID program strengths is bringing students together into a tight academic community. Students form close peer groups around their shared identity of AVID. These groups can be especially important for keeping underrepresented students focused on being successful in school and on track to attend college (McKenna, 2011). The community building aspect of AVID can have be powerful driving force to getting underrepresented students into a college. In fact, students "[e]xposed to the cultural capital of both the dominant class and the world of school facilitated the academic success of students and negated the impact that the lack of cultural capital had on academic achievement" (Franklin, 2011, p. 19). This unique classroom community holds students accountable for their actions and school attendance. Research shows that AVID programs that "...increase engagement and personalization with students and families

were also successful in positively affecting attendance rates” (Franklin, 2011, p. 26). Besides attendance, these tight communities groups have the power to increase self-efficacy or one's ability to believe in themselves. AVID’s ability to increase GPA, attendance and self-efficacy especially among African Americans make it a powerful tool in decreasing the nation's achievement gap (Pugh, 2015).

In conclusion, AVID’s curriculum has been successful at getting underrepresented students into college (Franklin, 2011). The programs pre-packaged curriculum teaches students skills in writing, reading, note-taking and organization, while providing them with a community of support. Students enrolled in AVID are more likely to obtain high GPAs and attend a college after graduating high school than their non-AVID peers (Franklin, 2011).

Conclusion

The main focus of this capstone is to examine whether a service-learning project in a non-science classroom can motivate students to be better stewards. The literature presents a strong case for using a service-learning project to create environmental action by getting students to work directly with the community on a single issue. Students working on service-learning projects get deeply engaged and drive projects that can potentially help solve, or bring awareness to, important environmental issues. Besides connecting students to an issue, service-learning projects have the added bonus of helping students improve their self-esteem and leadership skills (Beachman, Maahs-Fladung & McFadden, 2009). Finally, the literature demonstrates that there is not a strong link between environmental knowledge and pro-environmental action, thus supporting the use

of an environmental service-learning project in a non-science class like AVID (Kollmuss & Agyeman, 2010).

The literature also examined the psychology behind environmental attitudes and environmental motivation. Environmental attitudes correlate with age, childhood exposure with nature, and families values (Lyons & Breakwell, 1994). Environmental attitudes and knowledge do not always directly cause environmental action; social norms and direct experience with the environment are more likely to predict action (Lyons & Breakwell, 1994). The literature demonstrates that motivating people to action can be difficult. People are motivated by their ego because they are concerned about how the environment will affect them, while others are more altruistic and motivated by doing what is best for their community (Bramston, 2010). The best way to motivate people to action, according to the academic literature, is by appealing to a person's emotions and encouraging them to make small, sustainable changes that will hopefully become habit (Manning, 2009).

CHAPTER 3

Methods

Introduction

A major component of many Environmental Education (EE) programs is to motivate students to action (Krasny & Monroe, 2015). Just teaching students about environmental issues does not necessarily lead to the environmental action that EE programs strive for (Kollmuss & Agyeman, 2010). Research has shown that people are motivated to act when they believe strongly in an environmental issue, and when the action required does not alter their lifestyle too much (Manning, 2009). These small lifestyle changes make people feel good because they are helping the environment without altering their former habits a great deal. Overtime, these small changes become their new habit. Organizing teenagers into service-learning groups to focus on one environmental issue may help students gain that needed passion for an environmental issue. Student lead service-learning projects might also provide students with a tool to help solve and engage others in environmental issues.

Chapter 7 focuses on the methodology and the process of collecting data that was used to answer the research question: *how does an environmental based service-learning project in a non-science classroom affect student's values and motivate them to be better stewards?* The chapter includes a description of the studies participants and research methods. A rationale for choosing the mixed methods approach and data collection tools is also provided. Finally, this chapter explains the methodology used to analyze the collected research data.

Research Paradigm

A mixed methods research approach was used to conduct this study. This approach compared quantitative data such as student surveys to qualitative data like interviews in order to increase the validity of the data (Creswell, 2014). Both quantitative and qualitative data was collected and analyzed to measure student's values and evaluate if there was any change after the completion of their service-learning project. Comparing multiple types of research data better gauges a potential shift in students environmental attitudes. The quantitative survey measured student's initial environmental values and motivation. After completing the service-learning project, the studies participants all took the same survey, while five students also participated in a qualitative interview. Collecting multiple forms of data within the mixed method approach will strengthen the data analysis. The mixed method approach assumes that every kind of data collection has some form of bias, and that combining multiple forms will only increase the likelihood that the analysis is valid (Creswell, 2014).

Research Method

This study used a convergent mixed method approach to collect data. A mixed method approach combines both quantitative and qualitative data to provide "... a more complete understanding of a research problem than either approach alone" (Creswell, 2014, p. 32). To be consistent with the convergent mixed method approach, this study collected and analyzed quantitative and qualitative data independently before comparing the results (Creswell, 2014). The study used different forms of data around the same concepts of environmental attitudes and motivation. The assumption is that even though

the students are being measured differently, the results should support each other (Creswell, 2014).

Quantitative and qualitative data was collected, analyzed and compared to accurately measure student's attitudes towards the environment. The quantitative data was collected using surveys while the qualitative data was obtained through one on one interviews and observations. The students were surveyed prior to their service-learning project and then again after the project's completion. The follow-up student qualitative interviews will give the students an opportunity to express their feelings with more nuanced details.

Participants

Forty tenth grade AVID students participated in the research. The majority of the student participants were female (33), with only seven students male. Seventeen of the students listed their federal designation as black, five as Asian or Pacific Islander, and eight as Hispanic. The classroom demographics are more diverse than the overall high school in which they attended. The average GPA for the participants was roughly 3.0 with all forty students planning on attending a two or four year university post high school graduation at the time of the study. All students that participated in the capstone research did so voluntarily, but their completion of a service-learning project was a required component of their AVID classroom curriculum.

Setting

Students completed their project in a suburban high school located within 20 miles of a major Minnesotan metro area. The high school had 1600 students, 125 staff members and a free and reduced lunch population of 34 percent at the time of the study.

The student body is 35% minority and the student graduation rate is 92%. The high school is located in a city with a population of roughly 50,000 people and an above state average median household income.

Methods

Procedure. Prior to the studies start, students were required to get informed consent to participate in the study from a parent or guardian. This approval form was approved by Hamline's Institutional Review Board. Parental consent was granted from every student subject that was included in the study. A copy of the informed consent can be found in Appendix A. Next, a baseline Likert scale survey was completed by the students prior to them beginning a service-learning project (see Appendix E). Students began their environmental service-learning project in late March of 2017 by first self-selecting their own groups of three to five students. Next, students brainstormed environmental service-learning topics, researched their topic, and proposed it to the class. The topic was approved or refined by the class before the group was allowed to continue. Students worked with their group and a community member for the next three months to complete their project. Students made a video or a presentation to demonstrate what their group achieved and also to bring awareness to their environmental issue. Upon completion of the project, students again took the Likert scale survey (see Appendix B), and five students were also interviewed one on one (see Appendix C).

Tools. Data was collected using various research tools, including Likert scale surveys, student journaling, observation notes and one on one-student interviews. The Likert scale survey measured the strength of student's environmental attitudes by having students rank how much they agreed with a statement from the New Ecological Paradigm

(NEP) survey. In addition, students responded to the same writing prompt in their classroom journals. These writing exercises were conducted to check in on student's attitudes about their topic throughout their project. Finally, student interviews were completed post completion of the project with a sampling of students.

Likert Scale. Students took the New Ecological Paradigm (NEP) Likert scale survey to measure their environmental attitudes prior to them beginning their environmental service-learning project (see Appendix E). The NEP is commonly used in before- and- after studies to measure the impact of an environmental program or activity and is “probably the most widely used measure of environmental values or attitudes worldwide” (Anderson, 2012, p.261). The NEP is made up of fifteen statements that “... relate to limits to growth, the position of humans in the environment, [and]the fragility of nature” (Harraway, Broughton-Ansin, Deaker, Jowett, & Shephard, 2012, p.178). The Likert scale survey measured the strength of student's environmental attitudes by having them rank on a five point scale how much they agreed with the fifteen statements from the New Ecological Paradigm (NEP) survey. The five-point scale asked students if they strongly agreed, agreed, were not sure, disagreed, or strongly disagreed with each of the fifteen statements. The eight odd numbered items are worded so that an agreement with the phrase is more pro-ecological, while the seven even numbered questions are worded so that disagreement equates to a stronger pro-ecological worldview (Dunlap, Jones, Mertig & Van Liere, 2000 p.8). The likert scale can also be broken down into five specific environmental facets. Questions one, six and eleven are aimed at measuring one's “reality of limits of growth”, questions two, seven and twelve examine “anti-anthropocentrism”, questions three, eight and thirteen study the “fragility of nature”, questions four, nine and

fourteen look at “rejection of exemptionalism” and finally questions five, ten and fifteen examine the “possibility of eco crisis” (Dunlap, Jones, Mertig & Van Liere, 2000 p.8). Scores from the survey were analyzed and later compared to the identical NEP Likert scale survey that was given post completion of their service-learning project.

Journals. Students responded to the same writing prompt on their service-learning project on two separate occasions. A copy of the writing prompts is included (see Appendix D). This qualitative tool was helpful to document changes in students attitudes throughout the project and was used during one on one interviews to help students reflect on their project.

Interview. Five students were interviewed one on one in order to get a complete picture of the effects their service-learning project had on their environmental attitude and motivation (see Appendix C). These interviews were conducted in a private setting, and away from classroom peers. These interviews provided students with a chance to vocalize their feelings about the project, explain if their environmental values shifted as a result, and describe if they were motivated to be more environmentally active because of the completed service-learning project.

Data Analysis

Student journals and interviews were compared and analyzed for common themes regarding environmental motivation, environmental attitudes and the success of the groups service-learning project. Unique individual responses were highlighted and compared to the common group themes in order to better understand any shifting attitudes or changes in environmental motivation.

The pre and post Likert scale survey data was also compared to look for differences. Each question was first compared individually; answers that did not change, or drastically changed as a result of the project, were of special importance. A student's total Likert scale survey score was calculated and compared. The scores were analyzed; differences and similarities between the pre and post survey were noted and interpreted.

Summary

A mixed method research approach was used to determine if an environmentally based service-learning project in a non-science classroom would affect student's values and motivate them to be better environmental stewards. The 40 AVID students that completed the service-learning project attend a Midwestern high school of about 1600 students with a free and reduced lunch population of 34%. Quantitative data was collected through student completed Likert scale surveys, while qualitative data was collected through student journals, and one on one interviews. The data was analyzed by comparing the pre and post Likert scale survey, as well as closely examining the student journals and interviews. Common themes and shifts in environmental attitudes and motivation were analyzed and interpreted.

CHAPTER FOUR

Results

Introduction

Research was completed in a high school classroom during a six-week period in the spring of 2017. The research was conducted to measure if an environmental service-learning project in a non-science classroom can motivate students to be better environmental stewards.

The study collected quantitative data through the NEP (New Ecological Paradigm) Likert scale survey and qualitative data through student writing prompts and student interviews. Students took the 15-question NEP Likert scale survey prior to completing an environmental service-learning project and then took the identical survey six weeks later, after they completed their environmental service-learning projects (see Appendix B). The quantitative data collected using the NEP Likert Scale survey will be reviewed, analyzed and interpreted. Qualitative data was also collected through reviewing student writing and interviews. This chapter will explore the results of each data collection tool and discuss any potential patterns in the data as it relates to the studies question *can an environmental service-learning project in a non-science classroom motivate students to be better environmental stewards*. Finally, chapter four will provide a summary of the study's results.

Review of Study and Data Collection Tools

Forty tenth grade AVID students in a suburban midwestern High School completed an environmental service-learning project. Of that pool, 28 completed an environmental service-learning project, the NEP Likert Scale, student writing prompts,

and were granted informed consent from their parent or guardian to participate in this study. Only the data collected from those students will be analyzed. Of those 28 students, 22 of them identified as female, and six as male. 24 of the students identified with a race other than white/ Caucasian and four will be transferring to an environmentally-themed high school as eleventh graders. The students themselves reported spending the average following time outside weekly: Nine students stated an average 0-4 hours per week outside, nine said they spent 5-9 hours outside, eight reported outside exposure as 10-14 hours, per week, one student spent between 15-19 hours, and one student spent 20 or more hours outside.

The service-learning project (see Appendix E) was completed in groups of three to five students on an environmental topic of the students' choice. Three of the eight projects involved designing and teaching an environmentally-themed lesson plan to younger students. Two groups worked to promote community gardens and pollinator friendly plants. Two other student groups completed a garbage audit and student survey within the high school with the goal of changing the school's recycling policy. Finally, one group completed their service-learning project by promoting environmental justice within the High School. All groups were required to write a research paper on their topic, work with at least one outside expert, and present the results of their project to the class.

Quantitative data was collected through the fifteen statements of the NEP Likert Scale Survey (see Appendix B). The NEP survey is formatted to measure and analyze a participant's ecological worldview. Students were asked to circle a number from one to five regarding how strongly they agreed with one of the fifteen statements. The eight odd numbered items are worded so that an agreement with the phrase is more pro-ecological,

while the seven even numbered questions are worded so that disagreement equates to a stronger pro-ecological worldview (Dunlap, Jones, Mertig & Van Liere, 2000 p.8). The Likert scale can also be broken down into five specific environmental facets. Questions one, six and eleven are aimed at measuring one's "reality of limits of growth;" questions two, seven and twelve examine "anti-anthropocentrism;" questions three, eight and thirteen study the "fragility of nature;" questions four, nine and fourteen look at "rejection of exemptionalism;" and finally questions five, ten and fifteen examine the "possibility of eco crisis" (Dunlap, Jones, Mertig & Van Liere, 2000 p.8). Students completed this survey prior to the start of their service-learning project and then took it a second time upon completion of their work.

Qualitative data was collected through student interviews (see Appendix C) and a student-writing prompt (see Appendix D). All students responded to the writing prompt: "Have you become more or less passionate about the topic you are working on? Why do you feel that way?" on two separate occasions. Student interviews were conducted with six randomly chosen students after their service-learning project was completed.

Analysis and Interpretation of NEP Likert Scale Survey

Students took the NEP Likert Scale Survey prior to them beginning their environmental service-learning project (see Figure 1). The NEP Scale is organized so that higher student scores (stronger agreement with the statement) on odd numbered questions have a pro-ecological worldview, while lower scores (disagreement with a statement) on even numbered questions symbolize a more pro-ecological worldview. This baseline data shows that students held strong opinions with statement five "humans are seriously abusing the environment" and seven "plants and animals have as much right as humans to

exist”. Fourteen out of the twenty-eight students chose “strongly agree” with statement number five and sixteen out of twenty-eight for statement seven. (see Figure 1). Students scored an average of 4.4 and 4.3 out of a possible 5 on these two questions respectively (see Figure 1) indicating that most students inherently understand the important influence humans have over the natural environment. Both of these statements do not deal with any specific environmental issues, but rather suggest a broad awareness to the harm humans may be causing.

According to the data, students held their least ecological view on statement one “we are approaching the limit of the number of people the earth can support,” question four “human ingenuity will make sure that we do not make the earth unlivable” and especially question six “ the Earth has plenty of natural resources if we just learn how to develop them.” Eleven out of the twenty-eight students (39%) strongly agreed with statement six (see Table 1). These three questions focus on human population and limits to human growth, suggesting that many students initially felt that the world’s population is not at the critical level many environmentalists believe. It also suggest that student’s believe that technology may potentially solve overpopulation fears. This is surprising considering that typically people that identify as male tend to believe that technology can provide environmental solutions, but this study is comprised of 79% female students (Kollmaus, 2010).

Figure 1 : NEP Likert Scale Data - Pre Service-Learning Project

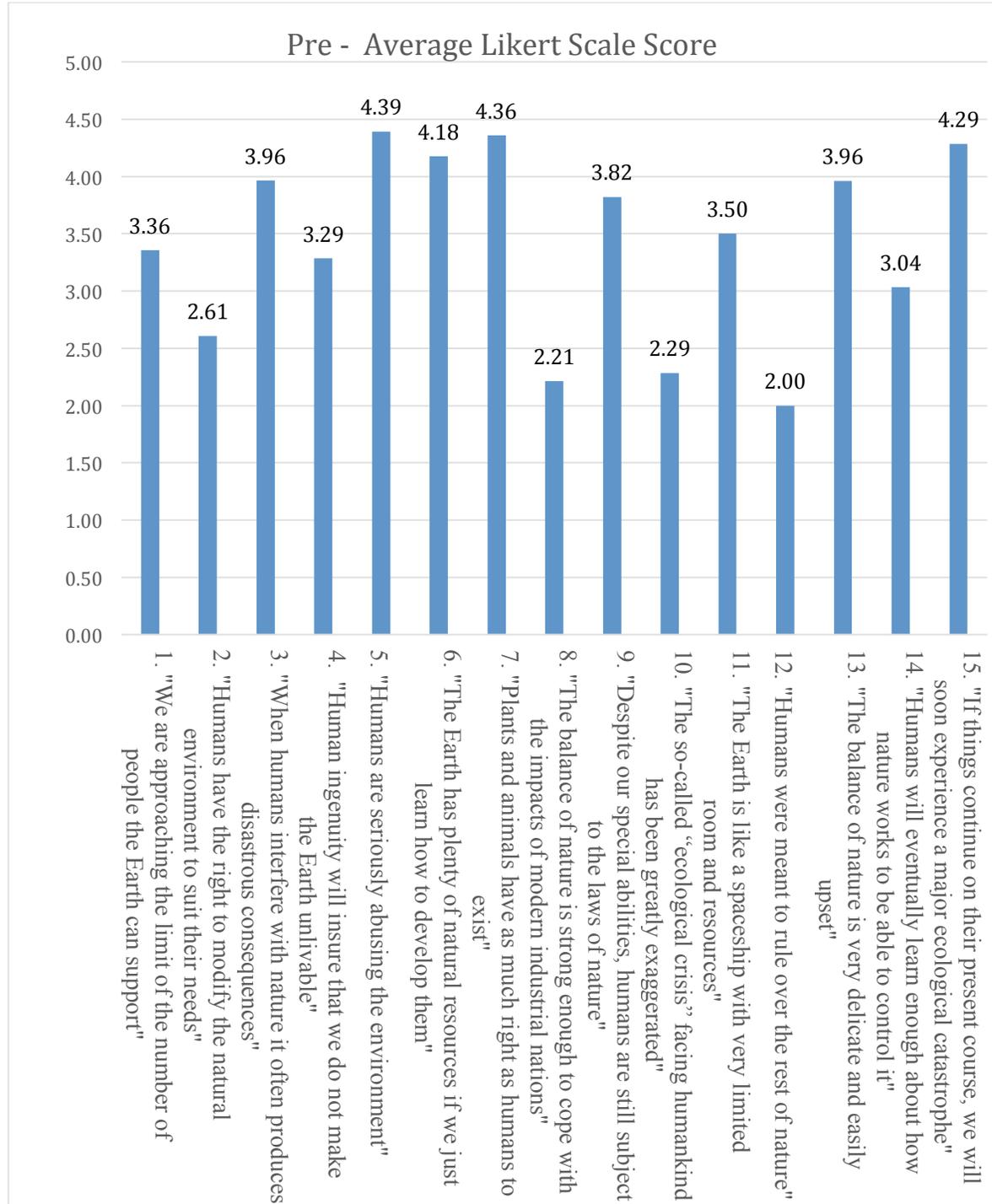
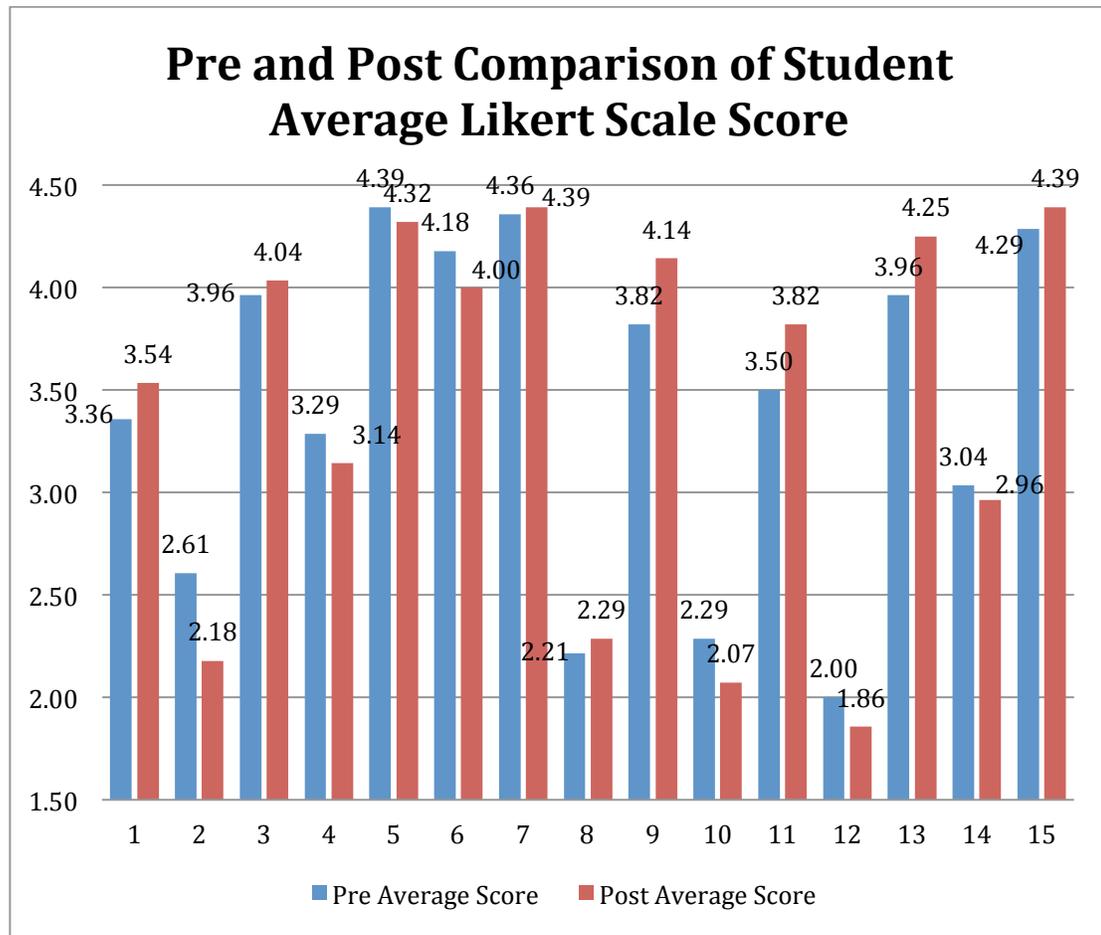


Table 1: Frequency Distribution of Student Responses- Pre and Post Service Learning Project

Question	Strongly Disagree		Disagree		Not Sure		Agree		Strongly Agree	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1: "We are approaching the limit of the number of people the Earth can support"	2	0	5	5	7	10	9	6	5	7
2: "Humans have the right to modify the natural environment to suit their needs"	4	4	9	17	9	5	6	2	0	0
3: "When humans interfere with nature it often produces disastrous consequences"	1	1	1	1	4	3	14	14	8	9
4: "Human ingenuity will insure that we do not make the Earth unlivable"	1	2	4	5	10	9	12	11	1	1
5: "Humans are seriously abusing the environment"	0	0	1	2	1	2	12	9	14	15
6: "The Earth has plenty of natural resources if we just learn how to develop them"	0	0	1	2	4	4	12	14	11	8
7: "Plants and animals have as much right as humans to exist"	0	0	2	2	2	1	8	9	16	16
8: "The balance of nature is strong enough to cope with the impacts of modern industrial nations"	8	6	10	11	6	8	4	3	0	0
9: "Despite our special abilities, humans are still subject to the laws of nature"	0	0	1	0	6	7	18	10	3	11
10: "The so-called "ecological crisis" facing humankind has been greatly exaggerated"	8	11	11	8	3	5	5	4	1	0
11: "The Earth is like a spaceship with very limited room and resources"	0	0	5	3	8	5	11	14	4	6
12: "Humans were meant to rule over the rest of nature"	11	13	10	9	4	3	2	3	1	0
13: "The balance of nature is very delicate and easily upset"	0	0	0	1	11	3	8	12	9	12
14: "Humans will eventually learn enough about how nature works to be able to control it"	3	2	5	7	9	10	10	8	1	1
15: "If things continue on their present course, we will soon experience a major ecological catastrophe"	0	0	1	1	2	2	13	10	12	15

The likert scale survey that students completed prior to their environmental service-learning project was compared to the results of the same survey post project completion (see Figure 2 and Table 1). Comparing the two will help identify any patterns in the data and possibly show any changes in students' environmental attitudes. The average score for nine of the fifteen statements (statements 1, 3, 4, 5, 6, 7, 8, 14, and 15) did not change in a statistically significant way (note: statistically significant will be defined as a change of at least 5% in this study). The consistency of these answers indicates that these are core environmental beliefs held by students. Even though student's attitudes did not drastically shift to these statements, it is noteworthy to point out that besides statement four and six, the average student responses are all considered pro-ecological.

Figure 2: NEP Likert Scale Data - Pre and Post Service-Learning Project



1 : "We are approaching the limit of the number of people the Earth can support"

2: "Humans have the right to modify the natural environment to suit their needs"

3: "When humans interfere with nature it often produces disastrous consequences"

4: "Human ingenuity will insure that we do not make the Earth unlivable"

5: "Humans are seriously abusing the environment"

6: "The Earth has plenty of natural resources if we just learn how to develop them"

7: "Plants and animals have as much right as humans to exist"

8: "The balance of nature is strong enough to cope with the impacts of modern industrial nations"

9 "Despite our special abilities, humans are still subject to the laws of nature"

10: "The so-called "ecological crisis" facing humankind has been greatly exaggerated"

11: "The Earth is like a spaceship with very limited room and resources"

12: "Humans were meant to rule over the rest of nature"

13: "The balance of nature is very delicate and easily upset"

14: "Humans will eventually learn enough about how nature works to be able to control it"

15: "If things continue on their present course, we will soon experience a major ecological catastrophe"

The average student answer changed over five percent from their pre-Likert scale survey for six of the fifteen questions (see Table 2). The most significant changes occurred with statement two (16%), ten (9%) and eleven (9%) (see Table 2). Statement ten: "the so-called "ecological crisis" facing humankind has been greatly exaggerated" changed by an average score of 9% in a more pro-ecological direction (see Table 2) suggesting that the students experience working with their service-learning project allowed them to realize that there are current and real environmental threats. The largest transformation happened with statement two: "humans have the right to modify the natural environment to suit their needs". Thirteen students (46%) disagreed or strongly disagreed with that statement during the first Likert Scale survey but twenty-one (75%) disagreed or strongly disagreed with the statement on the second, post-completion survey (see Table 1). The 16% change (see Table 2) in their average scores for statement two suggests that there was a meaningful shift in student's belief in their role in the environment, and that fewer students thought that natural resources are to be used just for their benefit. This pro-ecological shift is also supported by the 9% change in student's attitude regarding statement eleven: "the Earth is like a spaceship with very limited room and resources" and the 7% change to statement twelve: "humans were meant to rule over the rest of nature".

Table 2: Percent Change in Student's Average Responses to NEP Statement

NEP Statement	% Change in Student's Average Score
1. "We are approaching the limit of the number of people the Earth can support"	5%
2. "Humans have the right to modify the natural environment to suit their needs"	-16%*
3. "When humans interfere with nature it often produces disastrous consequences"	2%
4. "Human ingenuity will insure that we do not make the Earth unlivable"	-4%*
5. "Humans are seriously abusing the environment"	-2%
6. "The Earth has plenty of natural resources if we just learn how to develop them"	-4%*
7. "Plants and animals have as much right as humans to exist"	1%
8. "The balance of nature is strong enough to cope with the impacts of modern industrial nations"	3%*
9. "Despite our special abilities, humans are still subject to the laws of nature"	8%
10. "The so-called "ecological crisis" facing humankind has been greatly exaggerated"	-9%*
11. "The Earth is like a spaceship with very limited room and resources"	9%
12. "Humans were meant to rule over the rest of nature"	-7%*
13. "The balance of nature is very delicate and easily upset"	7%
14. "Humans will eventually learn enough about how nature works to be able to control it"	-2%*
15. "If things continue on their present course, we will soon experience a major ecological catastrophe"	3%

* Lower scores = more proecological worldview on even number questions

The data can be further analyzed when the NEP questionnaire is broken down into its five facets: "Reality of Limits of Growth", "Anti- anthropocentrism", "Fragility of Nature's Balance", "Rejection of Exemptionalism", and "Possibility of Eco crisis" (see Table 3) (Dunlap, Jones, Mertig & Van Liere, 2000 p.8). Breaking the data into these five areas allows for a better understanding of the specific environmental area student's attitudes may have shifted as a result of their service-learning project (see Table 3). Again, taking into consideration that even numbered questions are worded so that disagreeing with the statement is a more pro-ecological worldview. Out of the five facets, only two stand out as having statistically significant differences: "reality of limits of

growth” and “anti-anthropocentrism”. Student’s attitudes shifted on average over 5% for at least two of the three questions that compose those two facets (see Table 3). The student’s attitude became more pro-ecological for both of these areas. There were no statistically significant shifts in an environmental negative direction amongst any of the five facets.

Table 3: Percent Change In Student’s NEP Responses By Environmental Facet

Reality of Limits of Growth	
Question	% Change
1. "We are approaching the limit of the number of people the Earth can support"	5%
6. "The Earth has plenty of natural resources if we just learn how to develop them"	-4%
11. "The Earth is like a spaceship with very limited room and resources"	9%
Anti Anthropocentrism	
Question	% Change
2. "Humans have the right to modify the natural environment to suit their needs"	-16%
7. "Plants and animals have as much right as humans to exist"	1%
12. "Humans were meant to rule over the rest of nature"	-7%
Fragility of Natures Balance	
Question	% Change
3. "When humans interfere with nature it often produces disastrous consequences"	2%
8. "The balance of nature is strong enough to cope with the impacts of modern industrial nations"	3%
13. "The balance of nature is very delicate and easily upset"	7%
Rejection of Exemptionalism	
Question	% Change
4. "Human ingenuity will insure that we do not make the Earth unlivable"	-4%
9. "Despite our special abilities, humans are still subject to the laws of nature"	8%
14. "Humans will eventually learn enough about how nature works to be able to control it"	-2%
Possibility of Eco crisis	
Question	% Change
5. "Humans are seriously abusing the environment"	-2%
10. "The so-called “ecological crisis” facing humankind has been greatly exaggerated"	-9%
15. "If things continue on their present course, we will soon experience a major ecological catastrophe"	3%

The three questions that make up the facet “Reality of Limits of Growth” had a 5%, 4% and 9% change in a pro-environmental direction (see Table 3). This also implies that students adopted a stronger stance with the pro-environmental idea that the earth has a limited amount of resources and can only support a finite number of people. Their attitudes also shifted in regards to their “anti-anthropocentric worldview”. People with an anthropocentric worldview believe that humans are separate from nature, “morally superior” to other animals, and in control of the world resources (Denis, H. & Pereira, L. 2014, p.6). Having a worldview that is anti- anthropocentric is viewed as a stronger environmental stance. Student’s attitudes shifted the most in this facet of questions, changing 16%, 1% and 7% for the three questions (see Table 3). The statement that changed only 1% (“Plants and animals have as much right as humans to exist”) was one of the highest scoring pre-service learning scores and had less room to change. The overall shift in the anti-anthropocentric facet potentially demonstrates the effects that the service-learning projects had on student’s attitude in regards to the idea that humans should rule over or modify it. Students may have gained a stronger understanding of the symbiotic relationship humans have with nature.

The NEP Likert Scale is organized so that the more pro-ecological worldview a student has, the more they disagree with an even numbered statement. In order to compare the average total score between the pre and post likert scales the data for even number questions was inverted (1=5, 2=4, 3=3, 4=2, 5=1). This inverted data was first used to compare student scores with the amount of time they self-reported being outside (see Table 4). The assumption is that students that spend more time outside are going to inherently have a more pro-environmental attitude. While the data does support the

premise that more time outdoors equates to a stronger ecological worldview, there was not a large enough sample size of students reporting to be outside over 15 hours per week to consider this relevant. Part of this study's focus was on changing environmental attitudes with students that have had limited exposure to the outdoors or spend little time outside. Students that self-reported being outside 0-4 hours per week saw a significant change of 6% in their average NEP inverted score, while students that reported being outside 5-9 hours per week had just a slight increase of 4% (see Table 4). The increases in their total score are encouraging and supports the use of an environmental service learning project for students that typically do not spend a great deal of time outdoors.

Table 4 : Comparing Average Hours Outside Using Inverted NEP Score

Average Hours/ Week	0-4	5-9	10-14	15-19	20 or more
Number of Students	9	9	8	1	1
Pre Inverted Ave Score	3.597	3.64	3.38	4	4.6
Post Inverted Ave Score	3.83	3.79	3.757	4.13	3.933
% Change From Pre to Post	6%	4%	11%	3%	-15%

Finally, in order to provide a sense of an overall shift in student environmental attitude the average inverted score from the pre service-learning project was compared to their post average. The average NEP inverted score was a 53.9 for the pre service-learning questionnaire and 56.4 for the post, a change of 4.6% (see Table 5). This slight increase in student's total NEP score reflects a change in student's overall environmental worldview and could imply that an environmental service-learning project in a non-science classroom has some effect on student environmental attitude.

Table 5: Inverted NEP Score

Pre Average Inverted Score	53.9
Post Average Inverted Score	56.4
Percent Change	4.6%

Analysis and Interpretation of Student Writing Prompt

This section will compare student answers to the writing prompt: “Have you become more or less passionate about the topic you are working on? Why do you feel that way?” (see Appendix D). Students answered these questions in class on two separate occasions - both on May 22, 2017, and on June 8, 2017. Students were past the planning portion of their service-learning project and were beginning to complete their work when they were given the first writing prompt on May 22nd. All student groups had completed their project when they responded to the second writing prompt on June 8th.

The majority of students wrote that they were less passionate (43%) or indifferent (36%) about their topic during their first writing response (see Table 6). Only 21% of students said that their work on their service-learning project had made them more passionate at this time. The majority of student explanations for why they were less passionate were because of the volume of work the project demanded of them. All but two responses cited “the amount of work”, “stress” or “group dynamics” as the reason they were less passionate. Only one student remarked that she felt less passionate because she realized that their project “probably will not leave a lasting impact”. The overall negative responses measured more about how they felt about completing the project work than it did about student’s environmental attitude. However, the majority of the students that responded as more passionate (21%) typically did so not because of their group

dynamics, but because they believed they were having an “impact” and “could effect change”.

Table 6: Comparing Student Responses to Writing Prompt

	22-May-17		8-Jun-17	
	Number of Students	% of Students	Number of Students	% of Students
Students More Passionate	6	21%	19	68%
Students Less Passionate	12	43%	6	21%
Students Indifferent	10	36%	3	11%

Student answers to the second writing prompt, after they completed their service-learning project, were drastically different from their first responses. Student responded that 68% of them felt more passionate, 21% less passionate and 11% indifferent (see Table 6). Similarly to their first responses, almost all “less passionate” responses focused on their group dynamics or the amount of work that was required of them. The majority of the “more passionate” responses had similar pro-ecological themes. Fourteen of the nineteen students identified the “importance of their project” or the need to “spread awareness of the environment” as reasons they felt more passionate. One student responded that “I have learned so much over the course of the project and I believe that when I learn about something it makes me more engaged and eager to go on with it.” Three students stated that they were more passionate because they had fun or because they got to work with children.

Nineteen out of twenty eight students stated on their second writing opportunity that they were “more passionate” about their environmental topic, a rise of thirteen

students (see Table 6). This 216% increase (see Table 7) may have occurred for two reasons. It is possible that student's responses changed to "more passionate" because they were relieved that their project was completed. However, the large number of responses that included pro-environmental themes is encouraging and seems to indicate that students were more passionate, not because their work was completed, but because they learned new information, or felt empowered to make a difference.

Table 7: Percent Change in Students Attitude Towards Their Environmental Topic

Percent Change More Passionate	216%
Percent Change Less Passionate	-50%
Percent Change Indifferent	-70%

Item Analysis and Interpretation of Student Interviews

Six students participated in an interview (see Appendix C) about their experience participating in an environmental service-learning project. Four female and two male 10th grade students were chosen at random and asked the same six questions about their experience.

Question one asked students to discuss their topic and explain why their group chose it for their service-learning project. Four out of the six students stated that their group chose their topic randomly - that they did not have an environmental issue in mind but rather found one online or by talking to a teacher. These four groups chose topics that sounded easy or interesting. Between the other two groups, one group picked school recycling because they felt there was a need within the High School and another group chose environmental justice because they are passionate about the topic. These results are

not surprising given that students were required to pick an environmental themed service-learning project in a non-science class.

Question two asked the six students how successful they felt they were at accomplishing their group's goals (see Table 8). Four out of the six students believed that their group was "successful" or "mostly successful" with their service-learning project. Two students stated that their projects were incomplete and they needed to do more work in order to feel successful. Feeling successful may be important in changing student environmental attitudes and motivating students to environmental action. Students could be more skeptical about continuing with their topic or choosing another service learning project in the future if they did not feel successful.

Table 8: Comparing Student Responses To Interview Question Two

	Service Learning Project	Did you feel your project was successful or not successful?
Student A	Build Community Gardens	Indifferent
Student B	Plant Milkweed/ Bring Awareness about plight of Monarchs	Successful
Student C	Trash Audit/ Create recycling program in school	Successful
Student D	Teach kids about environmental issues	Mostly Successful
Student E	Survey and bring awareness to others environmental footprint	Pretty Successful
Student F	Environmental Justice informational campaign	Not Successful

Question three asked students what they learned about their environmental issue as a result of their service-learning project. Five out of the six students shared that they learned new information about their environmental topic, frequently citing that their topic is important and often underreported. Even though question three did not specifically address student learning outside of their environmental issue, half of the students also discussed how their project taught them valuable lessons about working within a group and one's community. While there is disagreement whether more environmental

knowledge transfers into environmental action, the interviews would indicate that completing a service-learning project can successfully teach students new content (Kollmuss & Agyeman, 2010). A deeper understanding of their environmental issue may have motivated some students to work harder to promote their cause and complete their project.

Question four asked students if their attitude towards the environment changed as a result of the project. Four out of the six students interviewed answered that they felt that their environmental attitude did change as a result of their project. One student stated that their attitude slightly changed, and one said that it did not at all (see Table 9). Most students reported that their deeper understanding of the issue is what influenced their attitude shift. This is surprising because no content was taught as a class; each group was responsible for their own research. This also supports the idea that an increase in knowledge can cause a change in a student's environmental attitude. All four students that reported that their project was a success also report that their environmental attitude changed. This correlation supports the idea that feeling success may influence a participant's attitude towards their project and environmental.

Table 9: Comparing Student Responses to Interview Question Two, Four, and Six

	Topic	2. Did you feel your project was successful or not successful?	4. Do you feel like your attitude towards the environment changed?	6. Did your project change your future behaviors?
Student A	Build Community Gardens	Indifferent	Yes	Yes
Student B	Plant Milkweed/ Informational Campaign About Monarchs	Successful	Yes	Yes
Student C	Trash Audit/ Create recycling Program In School	Successful	Yes	Yes
Student D	Teach kids about environmental issues	Mostly Successful	Yes	Yes
Student E	Informational Campaign- Environmental Footprint	Pretty Successful	Slightly	Slightly
Student F	Environmental Justice - Informational campaign	Not Successful	No	Yes

Question five asked students if they believed that their experience completing an environmental service-learning project affected their role in the community. Five out the six students surveyed I stated that they wanted to be more involved in the community as a result of their work (see Table 9). Typical student answers were that they were more interested in helping others, that they felt more part of the community and now see the value in teaching information to others. The one student who did not change their idea about community involvement stated that they were unmotivated because it is too difficult to make a large difference. Overall, this data supports the use of service-learning projects within a classroom setting as a means of getting more students engaged in the community. While question five was not specific to environmental activism, volunteering in the community and being part of a social group plays a critical role in motivating people to help the environment (Bramston, 2010, p. 784).

Finally, question six asked students if their future behaviors would change in any way as a result of completing their service-learning project. Five out the six students said

that they believed it would (see Table 9). Two of those five students stated that they would volunteer more in the future, while three stated that their project motivated them to continue promoting their environmental issue. Most surprisingly, the student that did not view their project as a success, nor felt a change in their environmental attitude, did see value in bringing awareness about their issue to others in the future.

Summary

In Chapter Four data was analyzed and interpreted through the NEP Likert Scale, student writing prompts and student interviews. This research was conducted to measure if an environmental service-learning project in a non-science classroom can motivate students to be better environmental stewards. The quantitative data collected through the NEP Likert Scale revealed a slight increase of 4.6% in students overall average score (see Table 5). This change is supported by the qualitative data that was collected through student writing prompts and interviews. Writing prompt responses showed an increase from 6 to 19 students that were “more passionate” about their environmental topic (see Table 6) and four out of the six students that were interviewed answered that they felt that their environmental stance changed as a result of their service-learning project (see Table 9). This shift in student attitude happened in a few specific areas, most noteworthy to the statement that “humans have the right to modify the natural environment to suit their needs” and within the “anti-anthropocentric worldview” facet. Most students that were interviewed attributed the new information they gained through their service-learning project for the shift in their environmental attitude. Overall, the studies finding seem to indicated that an environmental service-learning project in a non-science classroom can

change students attitudes and potentially motivate students to be better environmental stewards.

CHAPTER FIVE

Conclusion

Connection to Literature

Throughout its history, environmental education (EE) has focused on increasing students' environmental knowledge, changing their environmental values and motivating them to act. Many educators assume incorrectly that environmental action is a natural consequence of education (Kollmuss & Agyeman, 2010). However, this is not the case, and as a result many environmental educators are designing specific curriculum to motivate students to act. Many EE leaders believe that minorities and city dwellers do not value environmental education and want to engage students by focusing on relevant issues like nutrition, pollution, traffic, and even social issues to improve their community (Russ, 2015). Allowing students to choose their own service-learning topic permitted them to focus on issues that mattered to them and supported the EE trend of creating relevance for students rather than just focusing on teaching them new information.

The environmentally themed service-learning project was a great way to integrate EE curriculum into a non-science classroom. Students learn when they are given the freedom to work independently to solve problems they believe are important, and the skills to take action and help solve the issue. (Kesson & Oyler, 1999, p. 140). The service-learning project also promoted critical thinking and encouraged them to be more engaged in their community. Five out the six students surveyed stated that they wanted to be more involved in the community as a result of their work (see Table 9). Overall, this data supports the use of service-learning projects within a classroom setting as a means of creating more community involvement. Volunteering in the community and being part of

a social group plays a critical role in motivating people to help the environment (Bramston, 2010, p. 784). Students are going to be motivated by working with like-minded individuals and may also be encouraged by the potential success they could achieve by working with a larger group.

The qualitative data in this study revealed that many students were overwhelmed with the amount of work that was required to complete a service-learning project. Most of the students initially reported that they were less passionate or indifferent (see Table 6) about their topic because of the amount of work that it required. These results are worrisome because a similar study from North Carolina suggests that after completing a service-learning project, students are more likely to believe that they have too many responsibilities in their life to take time to help others (Beachman, Maahs-Fladung & McFadden, 2009, p.7-8). So even though most students stated that this project influenced their future behavior, and made them more likely to participate in the community, students might be apprehensive about taking on something similar because of the workload they remember experiencing. Psychologists argue that motivating students to environmental action is most likely when they are given an easy pathway (Manning, 2009). While overall most students reported being successful, many students did not find their service-learning project easy.

Psychologists also argue that EE programs need to appeal to a person's emotions and clearly show them how environmental issues relate to them (Manning, 2009). The student interviews and writing prompts from this study demonstrate that many students became more emotionally connected to their environmental topic as a result of completing their project. This emotional connection came either from gaining a deeper

passion about their environmental topic or as a result of them working with the community. Many students found that successfully working with children, their peers, or the public to be just as, if not more, rewarding. Finally, the service-learning project did not just allow students to become more passionate about an environmental topic; it also gave them a roadmap to take action.

There is disagreement within EE about whether more environmental knowledge transfers into environmental action (Kollmuss & Agyeman, 2010). While students reported being more informed about their environmental issue as a result of their work, this study did not focus on measuring that gain because of the lack of evidence connecting knowledge with action (Kollmuss & Agyeman, 2010). That said, exposing students in a non-science classroom to new environmental issues can only be a beneficial result. Students cannot act on an issue unless they know it exists.

The student interviews also indicated that completing a service-learning project successfully increased their environmental attitude (see Table 9); however it is unclear what long-term effect this might have. Most EE literature also does not support the idea that a person's environmental attitude directly correlates to their environmental action, but rather "...influence[s] behavioral intentions, which in turn shape our actions" (Kollmuss & Agyeman, 2010, p. 242). So while the studies results demonstrated a shift in students environmental attitude, this can not guarantee that they will be better environmental stewards, only that an EE service-learning project can provide a meaningful foundation for long-term behavioral change.

Limitations of Study

There are a few limitations to this study that need to be taken into consideration. Most participants of this study identified as female (79%) and as a result do not represent a typical high school classroom. Students were also limited by the amount of time they had to complete their service-learning project. The students had only a six-week window to complete their entire project. This may have limited the scope of their project and might have also been a significant reason many students reported being overwhelmed with the projects workload. Furthermore, there was not a large enough sample size of students who reported being outside over 15 hours per week to be considered relevant; this made it difficult to validate the assumption that students that spend more time outside inherently have a more pro-environmental attitude. While the data does support this premise, the sample size was too small to effectively link time spent outside to environmental attitude.

The data that was collected through the NEP Likert Scale Survey, writing prompts and student interviews also has limitations. The NEP Likert scale is a credible tool to measure student's environmental attitude, but uses language that may be difficult for some ELL or struggling readers to fully understand. This may have limited a few students ability to fully grasp the Likert Scale statement. The student writing prompts and interviews risk that students might provide answers they believe a teacher wants to hear. This might explain why the data from the student writing prompts and interviews was slightly more positive than the results of the NEP Likert Scale Survey. Finally, while students self-reported an increase in their environmental knowledge as a result of

completing their environmental service-learning project, no formal assessment was provided to measure their claim.

Future Research

There are some important questions about the validity of using an environmental service-learning project to promote stewardship that could benefit from further research. While this study demonstrated a slight increase in students overall environmental attitude, there is no guarantee that this change in attitude will drive pro-environmental action. A person's environmental attitude does not necessarily correlate to their environmental action and may depend on family customs, social norms, and the level of direct experience a person has had with an environmental concern (Kollmuss & Agyeman, 2010). People with a pro-environmental attitudes want to change their actions but are often limited by how much this new action would affect their current lifestyle. As a result, people are often only willing to make small behavioral changes that cost little money or take little time. Unfortunately, many pro-environmental people tend to choose the behaviors with the "least cost" (Kollmaus, 2010, p. 252). A follow-up study could measure the correlation between student's environmental attitude and their future action. Other beneficial research would measure how students environmental attitudes are affected by completing additional environmental service-learning projects. Finally, it would be valuable to complete a similar study with students of different age groups or with students that have a more extensive environmental background.

Reflection

One of the main obstacles in EE is motivating people to act. Many people understand the large environmental issues we face today, they want to do more to help,

but often struggle to make necessary lifestyle changes. This gap between a person's environmental knowledge and action is a huge hurdle in EE. The goals of this study were to expose students with different backgrounds to new environmental issues, change their environmental attitude, and teach them the skills to make an actual difference through a service-learning project.

The results of this study support the use of service-learning projects as a tool for achieving the EE goal of creating curriculum that is relevant to students' lives. The majority of the students in this study did not have an extensive background working with environmental issues, nor did most of the students spend a lot of time outdoors. Initially, many students showed little interest in completing such a large project with the environment. However, once they settled on an environmental topic and started doing research, many attitudes began to shift. The service-learning project is an excellent way to expose students to issues, connect students to their community and teach them new skills. Most students reported that they enjoyed working with other people in their community and are motivated to work more to drive change. Of course not all students will continue working to help their community or the environment, but hopefully they are more likely to as a result of this project. Students now understand a process in which they can make a difference and have been rewarded by the positive feeling one gets from doing community work.

Overall, the process of completing the capstone paper and corresponding service-learning project with students has been a success. Students discovered how to complete such a large group project with only a small amount of intervention from the teacher. Most students learned how to navigate difficult group dynamics and were proud of their

finished project. Their environmental attitude changed for the better and many students were exposed to the importance of new issues. The students' service-learning project was required to have an environmental theme only because it met the capstone requirements of this paper. However, it was a such a positive experience, that it will be continue to be the mandatory theme for years to come.

Summary

This study demonstrated that a service-learning project in a non-science classroom can slightly increase students' environmental attitude. Like other EE research, it is unclear if this increase in attitude will motivate action and make students better stewards. Follow-up research is needed to test the merits that a one time service-learning project can make students more likely to participate in the environment. While limited by the scope of the study, this work provides enough evidence to support the use of environmental service-learning projects in non-science classrooms to teach students skills, connect them with their community, and hopefully motivate future environmental action.

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Appendix A

April 10, 2017

Dear Parent or Guardian,

I am your child's AVID 10 teacher and a graduate student working on an advanced degree in education at Hamline University, St. Paul, Minnesota. As part of my graduate work, I plan to conduct research in my classroom from April 17 -June 10, 2017. The purpose of this letter is to ask your permission for your child to take part in my research.

I want to study how student participation in an environmental service-learning project affects their environmental attitude and motivation. Students will be working in small groups to complete an environmental service-learning project of their choice. The student-led service-learning project allows for students to work with community members and school leaders to bring awareness to an environmental issue that is important to them. My research will measure students' progress through writing prompts, a 15- question survey, and through an audio-recorded interview.

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 Hamline University IRB and from the principal of Apple Valley High School. 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 two and please return to me no later than April 17th, 2017.

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

Sincerely,

Nathan Fritz

920.379.7358

nathan.fritz@district196.org

Informed Consent to Participate in Quantitative and Qualitative 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 measuring students attitudes in response to an environmental service-learning project. I understand there is little to no risk involved for my child, that his/her confidentiality will be protected, and that I may withdraw or my child may withdraw from the study at any time.

Student's Name

Parent/Guardian Signature

Date

Participant copy

Informed Consent to Participate in Quantitative and Qualitative Data Collection

Please return this copy to Mr. Fritz by April 10th

I have received your letter about the study you plan to conduct in which you will measuring students attitudes in response to an environmental service-learning project. I understand there is little to no risk involved for my child, that his/her confidentiality will be protected, and that I may withdraw or my child may withdraw from the study at any time.

Student's Name

Parent/Guardian Signature

Date

Researcher Copy

Appendix B

NEP Likert Scale Survey

Revised NEP Likert Scale Survey

Directions: Read each statement and rank yourself using the scale below:

1= Strongly Disagree

2= Disagree

3= Not Sure

4= Agree

5= Strongly Agree

1. We are approaching the limit of the number of people the Earth can support.

1 2 3 4 5

2. Humans have the right to modify the natural environment to suit their needs.

1 2 3 4 5

3. When humans interfere with nature it often produces disastrous consequences.

1 2 3 4 5

4. Human ingenuity will insure that we do not make the Earth unlivable.

1 2 3 4 5

5. Humans are seriously abusing the environment.

1 2 3 4 5

6. The Earth has plenty of natural resources if we just learn how to develop them.

1 2 3 4 5

7. Plants and animals have as much right as humans to exist.

1 2 3 4 5

8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

1 2 3 4 5

9. Despite our special abilities, humans are still subject to the laws of nature.

1 2 3 4 5

10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.

1 2 3 4 5

11. The Earth is like a spaceship with very limited room and resources.

1 2 3 4 5

12. Humans were meant to rule over the rest of nature.

1 2 3 4 5

13. The balance of nature is very delicate and easily upset.

1 2 3 4 5

14. Humans will eventually learn enough about how nature works to be able to control it.

1 2 3 4 5

15. If things continue on their present course, we will soon experience a major ecological catastrophe.

1 2 3 4 5

**source (Anderson, 2012)*

Student Information

Do you plan on attending SES (School of Environmental Studies) next year? Yes or No

Why?

Gender Identity:

Please specify your ethnicity origin (race). Circle all that apply.

Caucasian or white Black or African American Hispanic or Latino

Asian or Pacific Islander Native American Other

I choose not to answer

What is the average amount of hours you spend outdoors per week? Circle one.

0-4 5-9 10-14 15-19 20 or more

How do you spend your time outside?

In the past have you volunteered in any capacity to work with the environment?

Why or Why not?

Appendix C

Student Interview Questions

1. Tell me about your topic, why did you choose your issue?
2. How successful do you feel like your group was at accomplishing its goals?
3. What did you learn about your issue from your experience completing a service-learning project? What did you learn about yourself ?
4. Do you feel like your attitude towards the environment changed from completing your project? How?
5. How has your experience affected your thinking about your role in helping the community?
6. Going forward, do you think completing your environmental service-learning project will change your future behaviors in any way?

Appendix D

Student Writing Prompt

1. Have you become more or less passionate about the topic you are working on?

Why do you feel that way at this moment?

Appendix E

Service Learning Project

This trimester you will be completing a service-learning project on an environmental theme. Service-learning projects are a process in which you choose a specific issue that is important to you and your community and attempt to solve it. Service learning projects address issues that are personally relevant to the participants, not just what is “most accessible”. These projects can be a powerful way to connect you to your community and take on important social concerns. Besides looking good on your college application, service learning projects can help improve your leadership, collaboration and communication skills.

Requirements for the Project (in groups of 3-5):

- You must log at least a total 20 hours on your project
- You must specify a specific group that you are serving
- You need to research the issue and possible solutions
- You must have a specific and measurable goal
- You must define roles for each group member to be responsible for
- You must create a “final product” and present your results to your classmates and outside community members.
- You must create something that can show future groups the legacy of your project. (pictures, something that someone else can inherit, etc.)

Steps of the Service-Learning Project:

Step 1: Complete a research paper on the benefits of service learning projects.

Step 2: Investigation. Your group will research and develop a list of environmental issues that are important to you and the community. Next, your group will brainstorm and choose a topic that will work the best. Finally, your group will present your issue and possible solution to the AVID 10 class. Mr. Fritz and the AVID 10 class will provide feedback and give approval for your project to proceed.

Step 3: Planning and preparation. Your group will create group norms, specific roles for each group member and a timeline for the project’s completion. Your plan must contain a specific and measurable goal. Finally, your group will need to reach out and connect with a community member that will be able to add expertise and guidance to your project along the way.

Step 4: Action. Follow through and carry out your plan. We will be doing quickwrites and check-ins along the way to see how it is going and alter your plan if necessary.

Step 5: Demonstration of results and celebration. You will be presenting the results of your project to the class and outside community members.

This project is worth 25% of your trimester grade

Service Learning Research Paper

AVID students are required to engage in the community and to volunteer. This year you will be participating in a service-learning project instead of just volunteering. There are many advantages to participating in this process. The first steps in this yearlong activity are to complete a research paper examining what service-learning means, look at examples of service learning, and identify the positive results.

Rationale:

- The service learning paper will help improve your writing and research skills
- The service learning paper will help you understand the process and benefits of completing your service learning project
- The service learning paper will help you understand how to properly cite articles and create a works cited page.

Guidelines:

- Your paper needs to have an introduction, body, and conclusion.
- Minimum of 500 words in length (not including works cited page)
- Your paper needs to use at least 3 different sources. Sources need to be cited properly within your paper and have a completed works cited page at the end. Feel free to use the links to articles below or choose your own articles. If you choose your own, make sure they are quality articles (not just lists!).
- Include direct quotations and paraphrases. Both quotes and paraphrases need to be cited!
- Your paper must include information explaining what a service learning project is, the benefits of participating in one and specific examples of students completing a project of their own.

Total 40 pts

Helpful Articles

http://www.nytimes.com/2010/01/03/education/edlife/03service-t.html?_r=0

<http://www.nytimes.com/2010/07/31/your-money/31shortcuts.html>

<http://youth.gov/youth-topics/service-learning/what-are-benefits-service-learning>

http://blogs.edweek.org/edweek/finding_common_ground/2012/01/the_importance_of_service_learning.html

<http://www.dailyherald.com/article/20120311/news/703119898/>

	Meets (4)	Approaching (3)	Emerging (2)	Does Not Meet (1)	No Attempt (0)
Content	Covers topic in-depth with details and examples. Subject knowledge is excellent. Covers all the required information	Includes essential knowledge about the topic. Subject knowledge appears to be good. Covers all the required information	Includes less than essential information about the topic and there are some factual errors.	Content is minimal and/or there are several factual errors about the topic	No content is included
Total	_____ / (x 4) 16				

	Meets (4)	Approaching (3)	Emerging (2)	Does Not Meet (1)	No Attempt (0)
Class Participation	Student is on task and uses class time. Student is not completing other homework, playing on the internet or on their phone	Student works well on the project. Minimal distraction. Not on cell phone or wasting class time.	Student made poor decisions in regards to use of in class work time. Some time was well spent, but occasionally class time was wasted		Students fail to turn in paper OR Student(s) made many poor decisions during in class work time.
In text citations And Works cited page	In text citations are in MLA with proper formatting Works cited page is formatted accurately in MLA with at least 3 sources	In text citations are not properly formatted. Works cited page contains at least 3 sources and has minimal formatting issues	Citations are not properly formatted in MLA. Works cited page has only 2 sources and minimal formatting issues	In text citations are incomplete Works cited page is missing sources and incorrectly formatted	No citations are provided
Total	_____ / (x2) 16				

	Meets (4)	Approaching (3)	Emerging (2)	Does Not Meet (1)	No Attempt (0)
Quality	At least 500 words in length Minor spelling and grammatical errors	At least 400 words in length. A few spelling and grammatical errors	At least 350 words in length Poor quality and in need of proofreading	At least 300 words in length. Poor quality and in need of proofreading	Students fail to hand in paper
Total	_____ / (x2) 8				

Service Learning Project: Brainstorming Issues

Use your brain, teachers, or any other resource to make a list of environmental issues your group thinks is important to our community or school. The websites below are great spots to start to get some ideas.

<http://readwriteact.org/files/2013/01/55-Environmental-Service-Learning-Projects.pdf>
<https://www.epa.gov/students/community-service-project-ideas-students-and-educators>
<https://sites.google.com/a/apps.edina.k12.mn.us/service-learning-edina/environmental-service-learning>

Issue	What I know already?	What I learned by doing more research?

Service Learning Planning

Project Title:

Group Members:

What is the environmental issue your group is going to work on?

What is a solution to the issue that your group can help accomplish?

How will you be able to measure if you accomplished your goal?

What specific group is your project serving?

Who could you contact from the community to help?

What is each group member's role?

Name:	Roles:

Service Learning Check In

Directions: Today, you will develop and reflect on your plan so far. Fill in the blanks. Feel free to share one copy and work on it in collab together.

Service Learning Layout and Reflection

Group Members' Names	
Project Title	

Requirement	Sample	Your Plan
<p>Logged 20 hours of planning, execution, research, and one-on-one time with group and service group</p> <p><i>What sort of things have you done? What do you still plan on doing?</i></p>	<p><i>So far, we have planned our initial event. We have made posters for advertisement through postermywall.com and also connected with Ms. Smith and Mr. Smith to put in video/daily announcements. We also plan to go visit the other AVID classes to personally invite them to our study session.</i></p> <p><i>We plan to meet for one hour weekly during spring trimester for actual one-on-one time with the service group and then one hour planning with our group.</i></p>	
<p>A SPECIFIED GROUP that you are serving</p> <p><i>Which group are you serving? How many people do you want to be part of the group? What impact are you hoping to have?</i></p>	<p><i>Our group is that of the senior citizens at the Care Center. We would ideally like to connect with a group of at least 20 senior citizens. We have heard through their activity coordinator that they are regular card players and they come down every Wednesday to play cards at 6:00. We plan to have our mixer at 7:00 after cards.</i></p> <p><i>We are hoping to have the group be more social and even have them invite one other resident who may not come to cards are other social events.</i></p>	
<p>RESEARCH needs to be a component of this</p> <p><i>What sort of research have you done or will you do? How has this research helped you so far? Insert the link to an article or other source (can be interview) that will allow</i></p>	<p><i>We have researched what the current and most popular authors of color are. We have consulted sites such as YALSA top reads and also looked at Amazon.com and Goodreads reviews.</i></p> <p><i>So far, we have submitted this list to Mr. Smith for approval. He has ordered 3 copies of each book. This research has helped us choose the most age-appropriate and popular books.</i></p>	

<p><i>you to make the greatest impact.</i></p>		
<p>A specified and measurable GOAL <i>What is your goal? It should be something that has a number on it (measurable) and should be something you can include in your “final product” presentation.</i></p>	<p><i>For our middle school students, we hope to increase their Math scores by a letter grade. We will ask their teacher since data privacy does not allow scores to be shared if we can have them fill out a weekly reflection. If it, we will collect objective and subjective data. The questions could be reflective in nature:</i></p> <ol style="list-style-type: none"> <i>1. How has your grade been affected by this tutoring session?</i> <i>2. What has been the most valuable piece of information you have received so far?</i> <i>3. What can we do to help?</i> <p><i>When we gather this weekly, we can collaborate as a group to compile the data into a data spreadsheet and also save the most valuable quotes.</i></p>	
<p>Some FINAL PRODUCT should be presented to an audience outside of the classroom that illustrates your results. <i>What will be your “final product”? Who will be your audience? What sort of information do you hope to share with them that will feel practical to them and you?</i></p>	<p><i>Our final product will be a round table discussion, and a mini-slideshow that illustrates the impact of community the importance of access to organic fruits and vegetables.</i></p> <p><i>There will be a discussion on the link between poverty and poor health, pesticides in vegetable mills, and the importance of good health in the community of Apple Valley.</i></p> <p><i>There will be a “taste testing” of some fruits and vegetables grown and also fliers to those who wish to access or sponsor a garden for the community.</i></p> <p><i>We will have pictures of our project in progress.</i></p>	
<p>Some EVIDENCE that you have made your mark <i>What will your “mark” be?</i></p>	<p><i>We will make sure to have book stands in the library as well as a visual of the Authors of Color section. We will also make sure that Mr. Smith adds in a highlighted section of the Media Center homepage that has this new section. We will pose in front of the sign and have short descriptions of each book on the website.</i></p>	

<p>SHARED RESPONSIBILITY of the group members. <i>Who will be responsible for what in the next 2 weeks?</i></p>	<p><i>Student 1:</i> Graphic Design of posters and connect with Mr. McCluskey about the website <i>Student 2:</i> Research books, type up descriptions and find images of books to put on the website. <i>Student 3:</i> Meet with Mr Smith to discuss titles and create an order lists with ISBN numbers and prices through Amazon.com</p>	
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Service Learning Project- Grading Rubric

	Meets (4)	Approaching (3)	Emerging (2)	Does not meet (1)	No Attempt (0)
Logged Hours X2	You logged 20hrs planning, executing and researching your service learning plan.	You logged at least 16hrs planning, executing and researching your service learning plan.	You logged at least 12hrs planning, executing and researching your service learning plan.	You logged at least 6hrs planning, executing and researching your service learning plan.	You logged 6 hrs or less of work.
Research x1	Your group researched in depth at least 5 separate environmental issues from 3 different sources. Your group included research when presenting your service learning idea and possible solution to the class for approval.	Your group researched in depth at least 4 separate environmental issues from 2 different sources. Your group included research when presenting your service learning idea and possible solution to the class for approval.	Your group researched in depth at least 2 separate environmental issues from 2 different sources. Your group presented your service learning idea and possible solution to the class for approval.	Your group researched in depth at least 1 separate environmental issues from 1 sources. Your group presented your service learning idea o the class for approval.	No attempt
Action Plan X2	Your group created and maintained specific roles and responsibilities for each group member. Your group developed and carried out an action plan that specified the group your project would be serving, created a measurable goal for your project, and delivered on your weekly goals.	Your group created and maintained specific roles and responsibilities for each group member. Your group developed and carried out an action plan that specified the group your project would be serving, created a measurable goal for your project and delivered most of your weekly goals.	Your group created specific roles and responsibilities for each group member. Your group developed an action plan that specified the group your project would be serving, created a measurable goal for your project and delivered some of your weekly goals.	Your group created specific roles and responsibilities for each group member. Your group developed action plan that specified the group your project would be serving, and delivered a few of your weekly goals.	No attempt
Community	Your group	Your group	Your group	Your group	No

engagement x1	developed an on going relationship with an outside community member or organization to help aid your service learning project.	contacted a community member or organization for help on two separate occasions	contacted a community member or organization for help one time but did not follow through	attempted to contact an outside but did not connect	attempt
Final Product X2	Your group used multimedia to present your service learning project. The presentation was at least 6 minutes in length and included research, your measurable goal and a reflection of what you learned and any further action steps that would help solve your issue.	Your group used multimedia to present your service learning project. The presentation was at least 4:30 in length and included research and a reflection of what you learned and any further action steps that would help solve your issue.	Your group used multimedia to present your service learning project. The presentation was at least 3:30 in length and included a reflection of what you learned and any further action steps that would help solve your issue.	Your group used multimedia to present your service learning project. The presentation was at least 2 minutes in length and included a reflection of what you learned and any further action steps that would help solve your issue.	No attempt

Total _____ / 32 pts