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THE USE OF AN ENVIRONMENTAL EDUCATION SERVICE
LEARNING PROJECT TO ENHANCE STUDENT
MOTIVATION IN A SECONDARY SCHOOL

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education:
Environmental Education

by
Mary Frances O'Connell-Hershey

December 2009

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Approved by:



Dr. Herbert Brunkhorst, First Reader



Dr. Joseph Jesunathadas, Second Reader

Nov 17, 2009
Date

ABSTRACT

Many high school students are missing out on one of the greatest opportunities of their life—successful completion of high school. About $\frac{1}{3}$ of all students in the United States drop out of high school, with that figure rising to about 50% for minorities. An area of greatest concern is the lack of motivation students show in school. Many of these students state that school has no real world application and so is not valid to their lives. Service-learning projects can create a sense of authenticity by allowing the students the opportunity to solve real community problems with a hands-on project and reflection. In this study two student cohorts from two separate classes completed assignments based on a traditional approach of education and an environmental science service-learning project. The control cohort of students ($N = 23$) was from an environmental science class. During the course of the two week study they took notes during a teacher-directed lecture, answered questions from the textbook, and completed a multiple choice test on the material. The experimental cohort ($N = 21$), from another class environmental class, used a service-learning project to plan a xeriscape garden for the school. These students planned the entire project on their own, giving them more

buy-in for the material. Both groups of students completed a fifteen statement pre-test survey before the two week study. After the study the completed a fifteen statement post-test survey with the same statements as the pre-test survey. The results of the two surveys did not show a strong correlation between student motivation and what type of learning process was performed. This may have been due to the time limit of the study. Further studies would need to be longer in time duration.

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I would also like to acknowledge Omar Safie for his insight into the environmental education field and teaching in general. He came to me during a difficult and trying time in my educational process and I will always be grateful for his support.

Most importantly, I would like to acknowledge Dr. Darleen Stoner. Her inspiration and dedication to the field of environmental education is exemplary. She was always excited about her craft and devoted to her students. Thank you for all you have taught me.

DEDICATION

With a glad heart and a deep gratitude I dedicate this thesis to my family. My mother was and is my hero. In the face of great adversity, she was always joyful. She taught me to continue on no matter how hard things got. I never doubted her love and belief in me. Ashley, my daughter is the joy of my life. She has always been proud of me and supported my pursuit of a higher education. Throughout the years she has let me live vicariously through her. May she continue to grow as a great woman and a beautiful person. And finally, my husband, who has been the love of my life for over thirty years. Thank you for your support, for doing my chores when I have been too busy, for your understanding of the commitment involved in pursuing my degree. You are my rock and I will always love you.

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CHAPTER ONE

BACKGROUND

Introduction

Environmental Education

"The primary goals of EE are to develop environmentally literate citizens and to promote responsible environmental behavior" (Culen, 2005). Being literate and responsible citizens are also goals of education. By using environmental education as the foundation for core subjects these goals can be met. Children, since they were very young, have been interested in the natural world around them. Even the simplest items (e.g. trees) can be used for cross-curricular teaching. Measuring for math; photosynthesis for science; poetry for language arts; history of the logging industry for social studies; drawing for art.

In 1977, the Tbilisi Declaration was set by UNESCO (United Nations Educational, Scientific and Cultural Organization), with the cooperation of the United Nations. This was the first Intergovernmental Conference on Environmental Education. The Declaration states that environmental education is a unifying theme and a link to the real world. This gives educators a platform on which

to teach students in varied subjects (Hungerford, Bluhm, Volk, & Ramsey, 2005).

Motivation

By the time children arrive at the secondary school (high school) level of their education they have been exposed to the environment in multiple ways. Whether this is through the formal classroom, by way of the content standards (Ong, 2004), or just playing outside their homes. In this way, students are already familiar with some aspects of environmental science. Any new learning within this framework can be added on to previous knowledge. Through a constructivist learning environment the teacher presents new material to match the knowledge students already possess (Brooks, 2001). One of the strongest learning styles is the service-learning project. It combines what the student knows with a meaningful service project in the community. There is also the added component that the student reflects (Bridgeland, DiIulio & Wulsin, 2008; Owens & Foos, 2007).

Children are naturally curious about their surroundings and like to explore. To them, the world can be their playground. Inserting instruction into this world can make the learning process more natural and students more successful in their schooling (Lieberman, 2007).

Students in high school who are struggling with their subjects often feel there is no point to what they are learning. Environmental education gives them prior knowledge and experience to apply new and, often for them, difficult concepts. Instead of struggling over and over in stand-alone subject classes, students will receive lessons that are integrated and have real-world meaning. Broad concepts that students use in several of their classes to develop their own problem-solving strategies (Brooks, 2001).

Studies show that students today have a high disinterest in education. This disinterest, or disidentification (Osborne, 1997), leads to low math and language art scores and elevated high school dropout rates. Conventional wisdom states that minorities are not connected to the environment (Bergman, 2007). Bridging these students with environmental education may lead them to a more successful educational experience.

Representative Castle from the United States Congress House Education and the Workforce Subcommittee has stated that, "there is a growing body of evidence that environmental education can be a vehicle for connecting other academic disciplines, such as science, math, social studies and language arts" (Baker, 2000). Learning by way

of environmental education allows students the chance to develop mastery of language arts and math in a context that is familiar to them. Students can be successful in high school without being subjected to more class time in areas where they struggle. They can develop an appreciation for the importance of the core subjects and how those subjects apply to the world around them.

John Dewey was an advocate for teaching students to be problem solvers and to think for themselves (John Dewey). Environmental science provides students the occasion to work cooperatively as a group and the opportunity to do real world problem solving. Thus, they feel that school has application to the real world. A democratic society is best served when students, and in fact children in general, learn to be independent thinkers. This can be achieved in a school setting through student autonomy and personal responsibility. Teachers should be guiding their students to function independently and to draw upon themselves a desire to learn. Only by internalizing can children truly power their own destiny. Communication is a process that flows back and forth between the giver and the receiver. If teachers only stand in front of the students and lecture (commonly referred to 'chalk and talk'), this is communication in only one

direction and not very effective. A student-centered curriculum allows opportunities for teaching students to participate in decision-making and thus how to be contributing members of a democratic society.

Children are naturally inquisitive; just watch a three year old squat on the ground to watch a caterpillar cross the sidewalk. When children are left to explore on their own, they will work their imagination to make sense of their environment; they will want to learn new things. Let children roam around a science laboratory or delve into the workings of Shakespeare. Give them a chance to discover on their own and they will probably have an improved insight into how in common all humans are. Giving students the honored task of participating in their own education has given many educators an inside view of what Dewey referred to. There is "an intimate connection between education and social action in a democracy" (John Dewey). Young people learn when they are actively involved.

"Members are most likely to accept solutions they have helped create, and they will work harder to carry out those solutions" (Adler & Rodman, 2009),

Unifying themes can be beneficial to people trying to understand new facts. Students are better engaged when the

subject is presented holistically. By scaffolding new information onto existing knowledge (in this case, trees), students are more apt to understand and remember the new details (Brooks, 2001).

Purpose of the Project

The purpose of this project was to show any possible variations in environmental education awareness and changes in student motivation among secondary students. Two groups of secondary students from a high desert suburban high school in Los Angeles County, California were chosen as the test groups. One acted as the control group and the other group of students as the experimental group. Both groups completed a pre-test survey and a post-test survey. However, the experimental group performed an environmental science service learning project between surveys. Between surveys, the control group carried out standard classroom assignments, including lecture and textbook questions.

Do students learn environmental science subjects better by doing a service learning project or by attending a lecture and answering questions from a textbook? Do these same students become more motivated in school by participating in a project? These two questions were the

basis of my thesis. Also, there is a great deal of literature that shows secondary students are unmotivated in school. By performing this study, I was able to gain insight in what types of activities may help to motivate these students. In this way, schools can develop improved curriculum that might, in turn, improve test scores.

Context of the Problem

One of the greatest problems in education in the United States is the high dropout rates for secondary students. Standardized test scores show many students in my high school district, Antelope Valley Union High School District, to be below proficient (California Department of education Policy and Evaluation Division, 2007). In other words, the students are not working or learning at their potential. These students are often put in extra support or remedial classes for math and language arts, which adds more stress to students who are already falling behind.

Studies show that students today have a high disinterest in education. This disinterest, or disidentification (Osborne 1997), leads to low math and language art scores and a high drop out (of high school) rate. Many students feel there is no connection between the work they complete in school and the results (Legault,

2006). Also, conventional wisdom states that minorities are not connected to the environment. By bridging these students with environmental education, they will be more successful.

Students enjoy a subject either through prior experience and delight or they develop situational interest for it during the course of engaging activities (Randlar & Bogner, 2007). Environmental education allows students the opportunity to immerse themselves in their core academic subjects to develop a deeper knowledge and dedication of environmental studies. The variety of courses covers a broad range of topics including geology, biology, chemistry, sociological, and political science (College Board). Because environmental science covers a wide range of topics it allows students the chance to experience the practical application of education and can give students higher order thinking skills that they will take with them after they graduate high school. Environmental education becomes the instrument for student involvement outside themselves and the students will see how they, as up and coming adults, can have an impact in their world. This gives them a feeling of empowerment and an internal locus of control. Thus, students are more motivated to succeed.

Significance of the Project

With increases in high school dropout rates and a continuing emphasis on achievement scores schools must work at finding ways to motivate students to succeed. This project is meant to demonstrate how students can learn in situations that do not necessarily include just lectures and textbooks. In other words, students can learn outside the box. The No Child Left Behind Act of 2001 requires students to learn standards and perform proficiently or better on high-stakes state tests linked to these standards. This project illustrates student motivation through a service learning project. Educators need to find ways to attract and encourage students in the classroom. By carrying out this project I have been able to test the knowledge and motivation of secondary students.

Assumptions

The following assumptions were made regarding the project:

1. Secondary students were in a traditional classroom setting.
2. Both cohorts were studying the same subject
3. All students were close to the same academic level.

4. All students lived in the same community.

Limitations and Delimitations

Limitations

The following limitations apply to the project:

1. The amount of time allotted for the environmental science service-learning project. It may have been too short a time frame to adequately cover all aspects of a service-learning project.
2. Parameters for academic information (certain standards had to be addressed).
3. The project was performed at the end of the school year. Students may have already been acquainted of certain aspects of the project.
4. Because the project was of a very limited time frame, the post-test survey came too soon after the pre-test survey.
5. The pre- and post-surveys were not checked for cultural biases.

Delimitations

The following delimitations apply to the project:

1. Time allotment for the project. It had to be completed before the end of the school year.

2. Supplies and information for the garden project.
3. Which students were allowed to participate (only my Advance Placement Environmental Science students).

Definitions

The following terms are defined as they apply to the project. Environmental Education can be defined as "fostering an awareness of environmental issues and problems, developing the skills to solve those problems, and inspiring a willingness to make effective decisions" (Cole, 2007). Bill Stapp states that the Belgrade definition of environmental education is, "an integral part of the educational process, aimed at practical problems of an interdisciplinary character" (Hungerford, 2005). It is also an integrating focus, pulling several disciplines together in one package.

Motivation can be described as taking pleasure in an activity and thus doing well in it (Legault, Green-Demers, & Pelletier, 2006; Randler & Bogner, 2007). According to the report *A Nation At Risk*, students who are considered at-risk include those who are functionally illiterate, do poorly on standardized tests, do not demonstrate higher

order thinking skills, and low math and science grades. These students are often not motivated in school.

The Alliance for Service Learning in Education Reform (1993), states that

service learning implies a deliberate connection between the learning objectives and the service with substantial opportunity for students to reflect on the service experience. Problems need to be authentic to the course content and that instructors help students process their learning through ample time for reflection.

This gives the picture that students acquire knowledge, become aware of community problems, help to solve those problems, and then reflect on the process.

Xeriscape is gardening that uses native and adaptive plants that require a little amount of water (Broydo, 1997). Drip irrigation is usually sufficient to keep the plants healthy. Once the plants are established, there is minimal watering that needs to be done (Mezitt, 20205). It is not about planting just cactus, but being wise on using drought-tolerant plants. It is about planting and maintaining attractive, sustainable landscapes (Mezitt, 2005).

Organization of the Thesis

The thesis portion of the project was divided into five chapters. Chapter One provides an introduction to the context of the problem, purpose of the project, significance of the project, limitations and delimitations and definitions of terms. Chapter Two consists of a review of relevant literature. Chapter Three documents the steps used in developing the project. Chapter Four presents the results and discussion from the project. Chapter Five presents conclusions and recommendations drawn from the development of the project. Project references follow Chapter Five. Finally, the Project references.

CHAPTER TWO
REVIEW OF THE LITERATURE

Introduction

At-risk students include those who come from socioeconomically disadvantaged backgrounds, low academic achievers, low self-esteem, and difficult home lives. These students run the danger of falling behind in school, doing poorly on standardized tests, and possibly dropping out of school (Donnelly, 1987). The economic impact on society is enormous, ranging from poor job choices to living on government assistance. Students of color are especially in danger of such things as dropping out of school (Hood, 2004). By giving students a sense of place they are more apt to apply themselves in school. Environmental education has the ability to combine academic instruction (knowledge) along with how to solve problems (skills) and the motivation for solving them (incentive) (Hungerford et al., p. 34). Environmental education is an integrated subject encompassing science, social studies, math, and language arts. The reasons behind academic success among students are not always apparent (Bartosh, 2003). However, studies show that overall, students in an environmental education program

perform better than students in a more traditional setting (State Education and Environmental Roundtable, 2005).

At-risk Students and Minorities

On August 30, 2006, *USA Today* reported that SAT scores "fell 7 points - the biggest drop in 31 years" (Marklein, 2006). This decline was in both math and reading. Participation rates were down among Hispanics and African Americans. Students who are more typically stereotyped as academically inferior are the ones who are most likely to suffer in school (Osborne, 1997). Carolyn Finney, with the Department of Environmental Science, Policy and Management at the University of California, Berkeley, states that, "African Americans are intentionally or unintentionally excluded," from environmental issues. Students who are academically disidentified do not care if they are successful in school or not (Osborne, 1997). There is a "lack of motivation toward academic activities" (Legault et al., 2006).

At-risk students are closely linked to difficulties in school including dropping out of high school (Janosz, Archambault, Morizot, & Pagani, 2008). Several studies, including one by the Carnegie Corporation of New York, show that at least 30 percent of all high school students,

including 50 percent of minorities such as Hispanics and African American, drop out of high school (Hood, 2004; Swanson, 2004). High school dropout earnings have a detrimental impact on themselves and society. They typically earn on average about \$21,000 per year as opposed to those with a high school diploma, who earn about \$31,000 per year (Bureau of Labor, 2009; Hood, 2004). This constitutes a lifetime earnings difference of \$400,000; the difference of owning their own home and realizing the American Dream. Other consequences of dropping out of high school include a greater chance of ending up on welfare and going to jail.

The United States census shows that America is made up of 30% minorities (Taylor, 2007) and yet they account for a very small percent of those who are involved in environmental fields (NAAEE, 2007). Latinos and African Americans have continually been marginalized in environmental education and jobs (Hong & Anderson, 2006; Bergman, 2007). With the minority population in the United States expected to reach 50% within in the next fifteen years, it is imperative that we address these issues. As most environmental educators are white, middle class, we need to rethink how we teach our subject. According to Anna Gahl Cole (2007), we need to, "rethink notions of

environment and environmental literacy by addressing the ways power, race, class, gender, and politics shape human interactions with the land.”

Motivation

Several reasons have been cited for the reasons students drop out of school. Many have to do with being bored because they feel there is no real world application to what they are learning in class (Sawson, 2004). Also, disinterest and lack of engagement have been cited as reasons for dropping out. Bringing the classroom educational experience into the real world will give students more motivation to do well in school.

According to a study by the Civic Enterprise for the Bill and Melinda Gates Foundation students cited several reasons for dropping out of high school (Swanson, 2004). Reasons included are disinterest in school and failing (even before they reached high school). Most students who dropped out said they could have graduated if they had tried. The study reported that the dropouts believe improvement can come from making schools more engaging and real-world and support systems for struggling learners (Swanson, 2004). By incorporating environmental education

subjects into the curriculum, students will have another opportunity to succeed in school.

There has been a wealth of research articles written on student motivation but very few on student amotivation. A study by Legault, Green-Demers, and Pelletier (2006) focused on two areas. In the first area, the researchers were looking to validate the structure of academic amotivation (what are the parts that make up amotivation among students?). The second purpose was to investigate if there are any social implications on student amotivation, and how these two areas can show any academic consequences.

Students approach their education based on any combination of three motivators: intrinsic motive, extrinsic motive, or amotivation. Amotivation, an area not well researched, is when students feel there is no relationship between what they do and a possible outcome. These students believe that they have no control over their situation and thus no control over how they perform in school. Due to this outlook, many amotivated students show poor school performance and are likely to drop out of school altogether.

This study showed that there are four subtypes of academic amotivation, which include ability beliefs,

effort beliefs, characteristics of the task, and value placed on the task. The four amotivation dimensions, combined with certain social tenets, can lead to poor academic performance and high school dropout.

Ability beliefs can be described as *I don't believe I can, therefore, I can't*. Students go into school with a pre-formed judgment of their lack of ability. Since poor self-esteem is an indicator of academic failure, this lack of confidence sets them up for disappointment before they even start (Legault et al., 2006). However, if students enter a school setting with a positive self-view and actively participate in school (e.g. attend school regularly, do their assignments, participate in extra-curricular activities), this resilience leads to academic success (Finn & Rock, 1997).

Effort beliefs, the second dimension, are illustrated in the statement, *I can or I can't, but I'm can't maintain the effort*. Students with effort beliefs do not have the ability to initiate or maintain academic effort in school. Due to this lack of desire to even try, students show academic detachment (Legault et al., 2006). This attitude can also be placed in the category of nonresilient completer (Finn & Rock, 1997). These students finish school but with poor academic performance. Although they

will do minimal work, but because they cannot maintain the effort of success they barely finish school.

The third subtype, characteristics of the task, deals with school being boring or tedious. There is no pleasure or joy in school for these students. Students need more than just lecture and textbook work. This type of "chalk and talk" approach to education does not lead to motivation of the part of the students. Better approaches to learning should take into account the modalities or learning styles, of the students. This is especially important when dealing with a unit the students may not initially be interested in learning. Motivation can come through interesting instructional methods (Randler & Bogner, 2007)

In the Legault, Green-Demers, and Pelletier study (2006), value placed on the task is best described as *not important to me*. Students believe that school is not important to them. There is no value to an education because the task is not integral to their lives.

Negative social support is shown to have a positive correlation between amotivation and academic defeat. Autonomy, competence, and relatedness can facilitate intrinsic motivation (Legault et al., 2006). These three areas need to be acted upon by the students' parents,

teachers, and friends. Although parents showed the strongest provision for student achievement, competence was best performed by the teacher. This includes providing constructive feedback to students. Students often drop out because of their amotivation based on the devaluing of education coupled with a lack of relatedness.

Many risk factors play a role in a student's success in school. Risks may include academic difficulty, being a minority, low-income, missing classes, and English as a second language. All of these aspects can lead to students' lack of motivation in school. When these reasons are dealt with, students' motivation rises and they become more successful. Although teachers cannot control many of these aspects, they do have control on engagement in the classroom. Engagement in school is "an essential component of dropout prevention programs" (Finn & Rock, 1997). Environmental education provides this essential component through hands-on learning in real-world settings.

There is considerable research on cognitive ability in relationship to enhancing academic achievement. A study by Randler and Bogner (2007) strove to look at the interest levels of students before they undertook a unit on lakes, during the lessons (which lasted several months), and then after the unit. The researchers then

showed correlations between interest and academic achievement.

There are two types of interest. The first is intrinsic, in which students come into a new unit with a specific, or predisposition, interest to the subject. This interest can lead to motivation and, in turn, success. The second type is when the context of the subject leads to situational interest. Situation interest is best described as a grab and hold. Students can be lured into situational interest by the environment in which it is presented and then they continue to show interest due to the lesson being appealing.

Prior research shows that interest levels decline between the ages of 10 to sixteen years (Randler & Bogner, 2007). However, interest can be achieved by either the theme (e.g. ecology of lakes) or the activities (e.g. experiments or group projects). The study showed differences in students in the three different stratifications (German students are split between three different stratifications based on their school performance and abilities). The students at the higher stratification showed greater interest.

Five measurements were used throughout this unit. A survey of predisposition, three measurements periodically

during the unit, and a post-survey were conducted with the students. Cognitive achievement was measured three times. There was a pre-test, class test, and a retention test after six weeks.

Interest declined during the course of the study. This may have been due to the way the survey was written. The pre- and post-surveys all started with "I would like to know more about that," which seems to work better as a pre-survey and not for the post. Once students learned about the subject of lakes over several months there was no need for the students to "know more." They may have been interested in the lessons but felt no need to learn more.

Specific (individual) interest prior to the unit and situational interest during the lessons significantly influenced interest after the instruction. The continued process of learning about the lakes may have lead to more interest as the students went about their work (Randler & Bogner, 2007). The authors claimed a correlation between interest scales and achievement tests. Prior interest in the subject had the most impact on achievement. This may show that success in school can be connected to prior exposure to specific subject matter.

The study by Randler and Bogner (2007) looked first at the students' specific topic or individual interest as predisposition. During the study they looked at situational interest three times and after the study they looked at the post unit interest or individual interest. Interest before the unit showed interest after the unit. Also, interest during the unit showed interest after the unit. Both of these can be attributed to either the students intrinsic interest or how the teacher was able to "grab and hold" the students' interest. The longer the unit progressed the more the students' situational interest in the subject increased. However, overall interest declined throughout the study. Again, this may be due to the nature of the statements the students were asked to complete ("I would like to know more about that,"). Achievement was more strongly correlated to prior interest than situational or retention (after) interest.

Interest in school may be as simple as the teacher creating interest in a particular unit. Although students come to school with a predisposition to their subjects, teachers can create an atmosphere of excitement through themes and activities. This type of situational interest can lead students to become more involved because the teacher puts value on the subject, thus the student places

value on it. Students' interest leads to motivation and to better learning and a more successful academic career. The situational interest can be as simple of presenting information in a manner that the students' age level finds appealing (e.g. biology may be boring, but sexual reproduction is not). Sometimes the method is interesting even if the subject is not (Randler & Bogner, 2007).

Environmental Education

Research shows that science, math, social studies, and language arts can be learned through environmental education (Lieberman & Hoody, 2007). Bill Stapp states that the Belgrade definition of environmental education is, "an integral part of the educational process, aimed at practical problems of an interdisciplinary character" (Hungerford, p. 36). The Tbilisi Declaration of 1977 states that environmental education should provide a wide range of practical skills and use a comprehensive approach (Hungerford, pp. 13-16) and, although the Tbilisi Declaration was specifically referring to environmental problems, the same skills are required in many areas of education. By using these same skills to learn about the environment, students acquire skills for thinking, analyzing, interpreting, reading, and writing.

Current environmental education in the United States comes from a long process of different teaching and learning practices. As early as the 1890s, students were taken outside to learn about nature in what was then called nature study (Disinger, p. 18). This usually consisted of walks and talks and not so much about actual learning. By the early 1900s, there was more of an emphasis on teaching Americans how to conserve our natural resources through conservation education. This was followed by outdoor education in which students were taken outdoors to learn by doing, as advocated by John Dewey (Disinger, p. 18). This process, from conserving the good natural resources to stopping human-made problems (e.g. pollution) has led to our current environmental education (EE) movement. There is currently a much greater focus on urban-caused problems and less on conservation issues. Early forms of EE were narrowly focused and compartmentalized. The heart of it was about the local resources and terrestrial. Also, it was mostly for elementary children and gave more leeway to a business as usual philosophy. Today, there is a broader view that incorporates the globe with all of its problems. There is more of an emphasis on people and their impacts and concerns. People of all ages, including adults, are

included and there is more research and a sense of urgency (Disinger, p. 22).

Project WILD, a supplementary curriculum with an emphasis on wildlife, is one of the foremost curriculum guides in environmental education. It was introduced in 1983 and is a strong supporter of hands-on, outdoor education. Their approach to EE has shown to be effective in integrating a variety of curricula. There have been a number of outside studies to show that students who participated in EE and Project WILD's program specifically gained knowledge, skills, and awareness towards wildlife and the environment (Project WILD, 2006). Again, this reiterates the idea that hands-on work by the students allows them more freedom of expression and more support for their own education.

Some research has shown that there is a correlation between environmental education and improved math and language arts test scores (State Education and Environmental Roundtable, 2005). In 2005, SEER (State Education and Environmental Roundtable) reported their findings from their study entitled *Closing the Achievement Gap* which "documented benefits ranging from better performance on standardized measures of academic

achievement to reduced discipline and classroom management problems.”

The goal of environmental education is develop an environmentally literate citizenry who will use their knowledge to support a positive environmental behavior. It is a linear proponent of knowledge - attitude - behavior (Culun, p. 37).

According to Havlick and Hourdequin (2005), environmental education can be divided into three basic elements. The first element is that the learning should emphasize contextualized knowledge. This is the 'what is it?' part of learning. Ideas presented in class are then linked to the world outside the classroom. This brings the facts of the teacher's 'chalk and talk' (lecture) and the textbook to a comprehension of what they really mean, thus allowing students the opportunity to be motivated. Introducing the real world grabs and holds the students and also allows them the freedom to explore (Randler & Bogner, 2007; Legault et al., 2006).

The second element is the use of multi-modal learning. This engages the students on their own level. It encourages a diversity of learning styles and helps them to see the information from several different perspectives. Because EE is often conducted out-of-doors,

it is easy to build variety into the curriculum (e.g. observation, math, writing, discussion).

Knowledge and responsibility is the last element of environmental education (Havlick & Hourdequin, 2005). Just knowing facts will not motivate students. Knowing what to do with those facts places more value on the tasks (Legault et al., 2006) and this creates motivation with the students. Having a way to use their knowledge and responsibility may give students better self-esteem and an internal locus of control. Studies have shown that self-esteem is related to academic achievement (Finn & Rock, 1997). The first two elements both support the third in that the student needs the knowledge learned by doing and then applying it.

A study by Julie Ernst, published in 2007, stated that environment-based education (EBE), an integrated approach of EE, can use the school environment and real world problems to integrate different sources of subject matter. She used exploratory survey research to sample 287 teachers on their decisions on whether to use environmental-based education. Although EE has shown to improve integration of subjects there has been little formalized professional development on training of teachers. For the most part, teachers will use integrated

version of EE if they already believe there is potential for a positive learning experience. Most teachers who do not use EBE, due in part because they do not know the proper way to proceed. Lack of environmental sensitivity is the main reason the surveyed teachers stated as to why they do not use EBE. Previous literature showed that teachers believe there is no relevance to the curriculum; they have too much material to cover to add another subject; lack of planning time or lack of money and administrative support as reasons for not using an integrated EE. These teachers do not see the integration component of EE (Ernst, 2007).

If teachers are to be encouraged to use EBE, the following are areas that need to be addressed: environmental literacy, knowledge, skills, and sensitivity; receptiveness to EBE with school support and positive environmental attitudes (Ernst, 2007). With the current emphasis on test scores and accountability, many teachers feel that environmental education is just adding another layer of responsibility to an already very full schedule. Teachers need to understand that EBE is not in addition to or in replacement of other subjects, but is a way to teach using multiple modalities and themes. Combining subjects into a smooth integration is one of

environmental education's greatest assets and works well for student involvement.

Service Learning

"Student engagement is an important component of academic resilience" (Finn, 1997). By requiring students to engage in hands-on activities and to apply their knowledge and skills to the real-world, students were more successful on standardized tests (State Education and Environmental Roundtable, 2005). The EIC (Environment as an Integrating Context) Model states that environmental education uses six best practices in education (Lieberman & Hoody, 1998). These include:

- Integrated-Interdisciplinary Instruction
- Collaborative Instruction
- Community-Based Investigations
- Learner-Centered, Constructivist Approaches
- Cooperative and Independent Learning
- Local Natural and Community Surroundings as the contest for learning

Since environmental education consists of "cultural, social, and political constructs" and economics (Cole, 2007) there are many avenues of instruction that teachers can use. Children enter into school with certain knowledge

of the world. A small child notices a caterpillar walking across the sidewalk; during family games the children add up the points; children learn how to 'bargain' with their parents to stay up late. All of these skills can be channeled into a positive learning experience by adding to them academically. Although there are many ways to teach and learn, I will discuss only one here—service learning.

The National Service-Learning Clearinghouse states that service learning includes service and learning objectives along with a measureable change in the recipient and the provider of the service (Learn and Serve). It is not enough to just clean up the field across from the school, students must learn something from the service and it must be measureable. The following is an example from the website of the National Service-Learning Clearinghouse on the difference between just cleaning-up trash and learning from the experience:

If school students collect trash out of an urban streambed, they are providing a service to the community as volunteers; a service that is highly valued and important. On the other hand, when school students collect trash from an urban streambed, then analyze what they found and possible sources so they can share the results with residents of the

neighborhood along with suggestions for reducing pollution, they are engaging in service-learning.

Service learning is a way for students to answer the question of why they are learning something (Shapiro, 2009). Teachers can use this learning process to teach across the curriculum in such areas as science, math, language arts, and social studies. They are in charge of researching their project and act upon what they have learned. In this manner, students retain the "information in a larger context than simply a fact in a textbook" (Shapiro, 2009). Students are also exposed to professionals in the field they are researching and doing the service learning project. In this way, they get to observe real professionals, doing real work, in the real world. Having them perform a service project also gives them a sense of pride in their work and creates an intrinsic desire to excel.

There are several obstacles to service learning education. Finding resources to use is one area. Teachers may have access to textbooks, but not usually much else. Students need to be able to go out into the 'field', whether that means literally or into a business. Supplies for such activities as cleaning up the river may be in short supply at the school. However, this can be a good

opportunity to connect with a business for their help (Shapiro, 2009).

Students are presented with a community problem. Using what they have learned in class, they present possible solutions to the problem. They use a service project to work on the problem in a meaningful way and, perhaps, solve the problem. After, they reflect on what they learned and the experience. Finally, they need to demonstrate their results (Bridgeland, DiIulio, & Wulsin, 2008; Owens & Foos, 2007).

Most students believe that if they had been given the opportunity to conduct service-learning projects, their motivation would have been greater (Bridgeland et al., 2008). Many of the problems presented in this thesis—amotivation, low test scores, no buy-in for school, dropouts—can be, if not solved, at least softened through the use of service-learning projects. In April 2008, a report titled, *Engaged for Success—Service-Learning as a Tool for High School Dropout Prevention* (Bridgeland et al., 2008). This report presented research showing the impact of service-learning on high school dropout rates. Service-learning can help improve test scores and narrow the gap of achievement between minority and majority students. Poor attendance is one of the factors that apply

to dropouts. When students are engaged at school they want to be at school.

There are many examples of service-learning projects going on in California. These students are "being cooperative, compassionate and connected" (Posnick-Goodwin, 2009). Subjects such as history, civics, writing, math, and science are covered. They are covering the standards while learning about the real world.

Summary

There is a great deal of literature, both primary and secondary sources, dealing with the enormous problems associated with today's education. It is no secret that students are failing to complete their high school education and that minority students show the greatest dropout rates. With reports like *The Silent Epidemic: Perspectives of High School Dropouts* (Bridgeland et al., 2008) detailing the plight of American education we see where there is much room for improvement. Students continue to feel disconnected from what is being taught, and the way it is being taught, in school. Most students do not see any real-world application to their lives or they're just plain bored. School has to have more meaning than 'chalk and talk'. Not only do students suffer long

term consequences of dropping out but democracy demands a literate citizenry. If we do not want these kids to become a drain on the system (e.g. jail, generational poverty), and if we want them to enjoy the benefits of the American Dream, we need to address some of these concerns.

Motivation has been cited as one of the greatest reasons why students drop out of high school. There is no meaning in what they learn so they don't bother.

One way that we can motivate students to do well in school is to teach in such a way as to create engagement and buy-in from the students. This can be accomplished through service-learning projects. When students have the opportunity to work on problems in their own community they feel a sense of pride-of-ownership. School is no longer boring or pointless. Joy can be brought back into the classroom with the teacher giving the students an opportunity to work outside the box and outside the classroom.

Environmental education is one of the most integrating of themes. It takes other subjects and combines and incorporates them together, weaving a pattern that students can enjoy and believe in. Because the environment and nature are some of the areas that children are first introduced to at a very young age, they are

already predisposed to a taste of what EE offers. And because EE does not need to be its own stand-alone subject it does not add layers of curriculum and accountability to an already overburden system in the classroom.

CHAPTER THREE

METHODOLOGY

Introduction

Chapter Three documents the steps used in developing the project. Specifically, the pre-test and post-test surveys, what the general subject of the unit was to be, which students would participate, what service-learning endeavor the students would do, what the control group was to complete, and how much time was allotted for the study. The population demographics were divulged along with standardized test scores and some financial information. The facilities situation was discussed.

Development

Resource and Content Validation

Four highly qualified educators, two in special education and two in general education, reviewed and validated the pre-test survey and the post-test survey. All were employees of a school that was not in the survey, but they are employed in the same district. The district in question uses common pacing guides and assessments for all the schools. In this way, the validation is suitable to the school where the study took place.

Design

The potential participants in the study included all of the students in my fifth and sixth period classes at a Los Angeles County, California suburban high school in the high desert. Participation was voluntary. The students were between the ages of 15 - 17 years old and encompassed juniors (11th grade) and seniors (12th grade). They included African American, Caucasian and Hispanic, and were split fairly evenly between females and males. The fifth period class acted as the control cohort while the sixth period class acted as the experimental cohort. Both classes were learning the same subject and both groups of students had taken the same prerequisite science classes (biology and chemistry).

The purpose of this study was to compare two separate groups of secondary students' performance motivation for a lesson on the balancing of competing effects on the environment. This was done using a standard teacher directed lesson and an environmental education service learning project. Students were split into two groups based on which class period they are attending. Fifth period acted as the control cohort and was taught in a conventional teacher directed method. This included lectures (chalk and talk), answering questions, and

preparing for a standardized test. Sixth period students were the experimental cohort and they used a student directed service learning project to learn about the subject - the balancing of competing effects on the environment. They were required to create a model of an art garden using the most environmentally-friendly components. Would students in sixth period be motivated to understand the importance of balancing human needs with the needs of the environment by applying on-going knowledge through the creation of a working model of the art garden? I hypothesized that students who use service learning to understand a complex subject would be better motivated to learn and thus have a better understanding than students who learn through traditional methods only.

Each student in the study (both cohorts) used a Lickert pre-test survey to assess prior motivation and knowledge. At the end of the two week study both cohorts used a Lickert post-test survey to evaluate motivation and understanding of the subject. A comparison of the responses to the Lickert tests was performed and analyzed. This included comparing the pre-test with the post-test for each cohort of students as well as comparing the two cohorts of students against each other. The study took

place each day for two weeks and was performed during regularly scheduled class time.

The Lickert pre-test and post-test surveys consisted of the same set of fifteen statements. Students in both cohorts were to choose one of four possible responses—strongly agree, agree, disagree, or strongly disagree. There was no gathering of gender or specific age information.

Population Served

This project was conducted at a suburban high school in Los Angeles County, California. The school has a population of students who have, for the most part, come out of urban schools from the major cities of Los Angeles County. Due to the school only being open for three and half years, the facilities were located in portable classrooms on black asphalt. The seniors and most of the juniors knew they would never be able to attend the new building, which was being constructed next door. This had a great impact on their lack of motivation and unwillingness to strive.

The enrollment for the school was 2,315. Most of the students in the project were juniors (11th grade) and seniors (12th grade). Demographics of Eastside's students

include 46% Hispanic, 33% African-American, 18% White, and 3% Asian/Filipino/Pacific Islander; of those students, 329 school-wide were in special education, 358 were English Learners (with the percentage increasing over the last three years), and the school as a whole was designated as Title I, with 72% of the students overall eligible for free and reduced lunch. Our student population is very transient, with students changing schools within and outside of our district.

Overall, our students have scored low in the state standardized tests; however, they have shown some improvement over the years. For the 2008 AYP (Annual Yearly Progress), a federal report, 40% of students school-wide were proficient in English and 33.5% of students school-wide were proficient in math. As the students progress from lower-end subjects to more advanced subjects their overall test scores have become worse. On the California Standards Test (CST) in 2007-08 for English: 72% of 9th graders tested at basic or below, while almost three quarters of the 10th graders and more than three quarters of 11th graders tested at basic or below. On the math CST for math, 93% of all students tested in Algebra I were at basic or below; while 96% of all Geometry students tested at basic or below; and, 97%

of all students tested in Algebra II were at basic or below (California...Data Statistics, 2008).

With respect to the CAHSEE (California High School Exit Exam), the English portion of the exam showed 63% of the 764 10th through 12th graders passed. For the math portion of the CAHSEE, 56% of the 850 10th through 12th graders passed. Because the project was done in the fourth year of the school's existence, there was no data on the number of students who will graduate. We finished our first year with 635 students and by the third quarter of the fourth year, we had 488. This will show a low graduation rate, which implies a high dropout rate.

Treatment

Both cohorts of environmental students in the project were given a pre-test survey to assess their position on academic motivation, environmental science, and xeriscape. For the next two weeks the students performed classroom activities and assignments based on whether they were in the control cohort or the experimental cohort.

Students in the control cohort completed customary activities and assignments. This included a teacher-directed lecture in which the students took notes. Also, the students were required to read a chapter in

their textbook and answer the questions at the end of the chapter. At the end of the two weeks they took a multiple choice test as part of their grade for the unit.

In the experimental cohort, the students took a different direction. Instead of a typical unit on water they participated in a service learning project. After completing the pre-test survey they were informed of the focus of their project. Our school would be opening up the new facilities in the next school year and wanted a garden that would not require much water. The students needed to plan this garden on their own while keeping in mind the scarcity of water in our desert. They split themselves into groups and self-assigned jobs to each group. The jobs consisted of: the general outlay of the garden; the costs involved; how much water was needed and where the water lines were to be placed; types of plants that are tolerant of our dry, hot and cold, and windy desert. Because of the money and time constraints, they were unable to actually plant the garden.

After two weeks, the assignments were completed for both cohorts. The control cohort and the experimental cohort both concluded by completing a post-test survey. The pre- and post-tests contained the same set of statements along with the same answer choices.

Data Analysis Procedures

After both the pre-test and the post-test surveys were completed by both cohorts the data was input into an SPSS program, version 17.0. Each of the fifteen statements was entered along with a numbering system to correspond to the possible responses. Strongly agree was designated four; agree was three; disagree was two; and strongly disagree was one. The total number of each answer designation for each statement was input for all students who participated.

Once the data was entered, it was then computed using a mean and standard deviation for each category. Students from each of the cohorts were compared, as were the findings for the pre- and post-test surveys within the cohorts.

Summary

Both the pre-test and the post-test survey were comprised of the same statements. This was to prevent any possible inconsistencies or bias in how the information was conveyed to the students (although cultural bias was not addressed). Another bias that was not taken into account was the students' loyalty to me. Most of the students had been in class in previous years and some were

in my environmental club. This was not taken into account. All biases should be addressed in any future studies. Statements were arranged in basic groupings of environmental education knowledge, real world application of school, service-learning projects, xeriscape and water usage, and the balancing of nature and people.

One of the areas of greatest concern that has been reviewed in this thesis is high school dropout rates. Research shows that students who are not engaged in school or believe that school has no relevance to their world are more apt to drop out (Legault et al., 2006). Also, students who do poorly in school will slowly stop coming to the school until they, too, drop out. Our school has a large minority group which has been shown to have lower participation in school (Osborne, 1997). Standardized test scores are very low at our school which has also shown to be a precursor to dropping out of school. By creating an atmosphere of fun and enjoyment, these students with so many of the characteristics of failure will have more reason to succeed.

CHAPTER FOUR
RESULTS AND DISCUSSION

Introduction

Included in Chapter Four was a presentation of the results of completing the project. Two groups participated in the project. The control cohort consisted of twenty-three students from one class. The experimental cohort consisted of twenty-one students from another class. Both cohorts were in the same subject and were taught by the same teacher. Each cohort took a pre-test survey and a post-test survey. Between the giving of the two surveys, pre- and post-, the control cohort performed regular classroom assignments including lecture, reading their textbook, and answering questions out of their textbooks, and taking a standard multiple choice test. After the pre-test survey the experimental group engaged in a service learning project and then they completed the post-test survey.

Both the pre-test and the post-test were analyzed using the SPSS, version 17.0 program. Each answer choice was assigned a number: Strongly Agree = 4; Agree = 3, Disagree = 2; and Strongly Disagree = 1. Each student's answer was input into the SPSS program. The means and

standard deviation for each was then computed. All the data was compiled into Data Table 1.

Presentation of Findings

The mean for the control group's students' answer to statements one and two in the pre-test, dealing with the understanding of environmental education, was 3.17 and 1.91 with a .388 and .668 standard deviation, respectively. Students in the experimental group showed means of 3.38 and 1.81 with standard deviations of .498 and .814. The post-test means for the control group show 3.13 and 1.91 for questions one and two. The standard deviations for these were .626 and .417. Experimental group for the post-test questions one and two were 3.33 and 2.10 with standard deviations of .483 and .944 respectively. Environmental education is an integral part of the educational process and thus, it was important to add statements in the surveys dealing with the students' understanding of it (Hungerford, p. 36).

In statement three the students were asked to rate their enjoyment of going outside to do school. Instructional methods can be as interesting and varied as going outside to learn (Randler & Bogner, 2007). The mean for the control group's pre-test was 3.48 with a .511

standard deviation. The experimental group showed a mean and standard deviation of 3.62 and .590. 3.52 was the mean for the control group's post-test for statement three with a .511 standard deviation. 3.71 was the experimental group's mean and their standard deviation was .561 for the post-test.

Students have stated that they would improve their chances of graduating if school had application to the real world (Bridgeland et al., 2007). The study by the Civic Enterprise for the Bill and Melinda Gates Foundation testifies to the fact that the dropouts believe improvement can come from making schools more engaging and real-world (Swanson, 2004). Classroom education versus real world application was dealt with in statements four and five dealt. Statement four, how classroom education has no application in the real world, the mean and standard deviation were 1.91 and .793 for the control group's pre-test. The experiment group illustrated a mean of 1.76 and a standard deviation of .625. The post-test for the control group was 2.22 mean and .736 for the standard deviation. 1.48 was the mean for the experimental group with .814 as the standard deviation. The mean for students stating that they would work harder if school was more "real" (question five) was 2.87 with a standard

deviation of .694 for the pre-test of the control group. The pre-test for the experimental group showed 3.05 mean and a standard deviation of .805. The control group's mean and standard deviation for statement five's post-test was 2.61 and .722, while the experimental group's mean and standard deviation was 3.33 and .483.

Service learning and hands-on learning were covered in statements six and seven. The mean for the control group's pre-test for statement six, which dealt with using service learning projects to apply classroom learning to the real world, was 2.87 and the standard deviation was .344. The experimental group's pre-test mean and standard deviation were 3.38 and .498, respectively. The control group's mean for the post-test was 3.00 and the standard deviation was .426. Statement six for the experimental group's mean and the standard deviation for the post-test were 3.10 and .301. Hands-on learning being used to better understand material being taught, statement seven, showed a mean of 3.26 and standard deviation of .689 for the pre-test of the control group. 3.62 was the mean and .498 was the standard deviation for the experimental group. The post-test for the control group demonstrated a mean of 3.04 and .562 as the standard deviation. The experimental group's mean for statement seven's post-test was 3.52 and

the standard deviation was .602. Since service learning, with its multiple facets, including knowledge, service to community, problem solving, and reflection (Bridgeland, DiIulio, & Wulsin, 2008; Owens & Foos, 2007), addresses the different learning modalities students would use, it was important to include these two statements in the surveys.

Xeriscape, landscaping without the addition of heavy irrigation (Broydo, 1997), was discussed in statements eight, nine and ten. Statement eight specifically deals with examples of xeriscape. 2.35 was the mean for the control group's pre-test, with the standard deviation being .573. The experimental group's mean and standard deviation for the pre-test were 3.05 and .805. For the post-test, the control group's mean was 2.43 and the standard deviation was .662, while the experimental group illustrated a mean of 2.43 and a standard deviation of .811.

The control group's pre-test for statement nine, which discussed schools using less grass and more concrete and thus needing minimal watering (Mezitt, 20205), showed a mean of 2.00 with a standard deviation of .853. The mean and standard deviation for the experimental group were 2.57 and 1.207, respectively. The post-test for the

control group demonstrated a mean of 2.30 with a standard deviation of .926. Statement nine for the experimental group's post-test mean was 2.67 and the standard deviation of 1.017. Statement ten, students would be willing to use xeriscape at home, came in at 2.35 mean and .647 standard deviation for the control group's pre-test. 2.95 and .805 for the experimental group's mean and standard deviation. The post-test for the control group was 2.35 mean and .487 standard deviation. The experimental group's were 2.48 and .928, respectively.

The biggest threat to nature is the alternation of habitats, was statement eleven. The pre-test for the control group showed a mean of 2.74 and a standard deviation of .619. While the experimental group's numbers were 2.71 for the mean and .902 for the standard deviation. The post-test for the control group was 3.00 and .674 for the mean and standard deviation, respectively. 3.33 and .658 were the experimental group's mean and standard deviation. This statement, along with statements twelve and thirteen, allowed the students the opportunity to express their opinions on the balancing of nature versus people; an important component of this project.

In statements twelve and thirteen the students were presented with nature and humans working in support of each other. The pre-test of the control group in statement twelve, dealing with balancing nature with humans taking second place, demonstrated a mean of 2.96 and a standard deviation of .638. The experimental group illustrated 2.81 for the mean and .680 for the standard deviation. The post-test for the control group was 2.87 and .548 for the mean and standard deviation, while the experimental group was 2.71 and .644. Statement thirteen discussed cooperation of humans and ecosystems we live in and at school. 3.26 was the mean for the pre-test of the control group and their standard deviation was .541. The pre-test for the experimental group was 3.29 for the mean and .561 for the standard deviation. The control group's post-test mean and standard deviation were 3.00 and .426. 3.43 was the mean and .507 was the standard deviation for the experimental group's post-test.

2.57 was the mean for the control group's pre-test for statement fourteen, which dealt with plants of the desert being unattractive. Plants do not have to be unattractive to save water (Mezitt, 20205) and many desert plants bloom annually. The standard deviation was .896 for the pre-test. The mean and standard deviation for the

experimental group was 2.95 and .973, respectively. The control group, for the post-test, showed 2.78 for the mean and .795 for the standard deviation. The experimental group exhibited 2.29 for their post-test mean and 1.056 for the standard deviation. Plants do not have to be unattractive to save water (Mezitt, 2005) and many desert plants bloom annually.

The final statement, number fifteen, talked about students being comfortable talking to others about how to save water. 3.00 and .674 was the mean and standard deviation for the control group's pre-test. The experimental group demonstrated 3.38 for the pre-test mean and .590 for the standard deviation. The control group's post-test was 3.00 for the mean and .522 for the standard deviation, while the experimental group's mean and standard deviation were 3.60 and .503. When students work on projects for their community, it gives them a sense of place and they are more apt to apply themselves in school.

Discussion of the Findings

Statements one and two, dealing with understanding the place for environmental education, the control group did not show much difference between the pre-test and the post-test for the mean (in the area of Agree), however,

there was more of a spread for the two different standard deviations. There was a 62% greater spread for statement one's post-test versus the pre-test. Also, statement two's standard deviation showed a spread of 62% greater for the pre-test against the post-test. At Agree, the experimental group's mean for statement one was similar for the pre- and post-test, as was their standard deviation. The mean for statement two, however, showed a weak Strong Disagree (at 1.81) for pre-test and Disagree for the post-test. With the standard deviation taken into account, there was a slight difference in outcome.

There was very little inconsistency between any of the means for statement three, enjoyment of going outside to do school assignments, for the control group or the experimental group, whether it was for the pre-test or the post-test. Also, there was little variance for any of the standard deviations. The means all ran in the Agree area. Most of the students in both groups prefer working outside.

Statements four and five, application of school in the real world, showed more of a spread between the means of the control group and the experimental group. Students in the control group showed a slight increase in the mean for statement four. They demonstrated a little less for

Disagree in the pre-test and a little over for the post-test. Also, there was a significant variance for the standard deviation for the experiment group between the pre- and post-test. The experimental group chose Strongly Disagree. Overall, both groups disagreed with the statement that in the classroom there is no application in the real world. Because the statement is a negative, it is unclear if the students understood what was being asked, especially based on the answers to statement five. In statement five the students weakly Disagreed (control group) and weakly Agreed (experimental group) that they would work harder if school was more "real". The two groups seemed to be unclear what was being asked. The control group showed a slight increase in Disagree between their pre- and post-tests. The experimental group showed a slight increase in Agreement from pre- to post-test. However, there was considerably less variance in their post-test than in their pre-test. That may show that the experimental group, after their project, developed a better understanding of what constitutes "real" work.

Statements six and seven both dealt with hands-on learning projects. The control group displayed only a slight change (.13) in their means from pre-test to post-test for statement six (service learning in the

classroom can be applied to the real world), in which they stated a weak Disagree to a weak Agree. The experimental group exhibited a strong Agree to a weaker Agree between the pre- and post-test. Although the experimental group was the one to perform the service learning project, they showed less agreement with the statement. Their standard deviation for the pre-test was considerably greater than for the post-test. One answer for this may be due to them having a better understanding of what a service learning project is after they performed it. For statement seven, both groups choose Agree overall. The control group's responses showed a weaker Agree, whereas the experimental group's responses were a stronger Agree. Both the control group's and the experimental group's pre- and post-test standard deviation demonstrated a fairly large variance.

Xeriscape was the key word for statements eight, nine, and ten. In statement eight, the control group showed less disagreement between the pre-test and the post-test. However, the experimental group showed more disagreement. There were fewer experimental students who agreed with the statement after the project. Since the statement says that xeriscape involves only desert plants, the experimental group would seem to a better understanding of what xeriscape means. Statement nine

deals with schools should plant less grass and more concrete and xeriscape. This was an interesting statement because these students had spent almost four years in a temporary school which consisted of all black asphalt (except for a small athletic field). The control group demonstrated from the pre- to post-test that they disagreed with this statement. There was very little change in their attitude. However, there was a wide variance in their standard deviations. Both the pre- and post-tests showed high variances. The same was true of the control group. Although they did not change much in their mean from the pre-test to the post-test, their standard deviation was high. This statement elicited some of the highest standard deviations for the whole project. Perhaps the students wanted to agree with the statement but having lived it in a hot and brutal way, they were not as likely to show agreement. The control group for statement ten, students being willing to use xeriscape at home, were the same for the pre- and post-test. Both showed Disagree. Although their standard deviation showed that the group overall was more consistent. The experimental group showed a very weak Disagree, almost an Agree, for the pre-test. They were less agreeable to the statement after the project.

Both the control group and the experimental group went from Disagree to Agree between the pre-test and the post-test for statement eleven. Statement eleven deals with alteration of habitats being the biggest threat to nature. The experimental group displayed the greatest change between their pre- and post-tests. Also, their standard deviation became less variant in their post-test. The students show a stronger confidence after they performed their project.

Statements twelve and thirteen contend with the interaction between nature and humans. Both the control group and the experimental group exhibited little change or differences between the pre-test and post-test and the two groups for either statement. The groups chose a weak Disagree for their pre- and post-test for statement twelve (humans should take second place to the balancing of nature). Both groups showed a slightly stronger Disagree in the post-test. For statement thirteen where students were asked about humans helping nature by working in cooperation with the ecosystem, the control group and the experimental group chose Agree with little variance. However, the control group revealed less agreement in their post-test. The experimental group revealed a stronger agreement in their post-test.

In statement fourteen, which talks about plants in the desert being unattractive, both groups chose Disagree. The control group displayed a decrease in the strength of their Disagree from the pre-test to the post-test. The experimental group showed a considerable strengthening of their disagreement. There were also wide variances in each of the tests. The variance could be due to the students not being sure what exactly a desert plant is.

The last statement, telling others about how to save water, demonstrated no change, Agree and Agree, in the control group's pre- and post-test mean. The students in the experimental group also chose Agree for both the pre- and post-test. However, there was a stronger agreement in their post-test.

Summary

There was not much difference within cohorts' pre-test and post-test to make any broad conclusions. This may have been due to the short time frame for the study. The students were fairly consistent in their desire to work outside, and in fact, the experimental cohort showed considerable enthusiasm during the study in being able to go where they wanted to go. Statements four and five may have been misleading to the students. A great many of them

strongly disagreed, thus stating that school does have real world application. In the future, this statement should be worded in the positive. The statements dealing with xeriscape and concrete elicited the most interesting responses. They know they live in the desert and that water is of significant importance. However, they were tired of dealing with the ugly campus with almost no plants. A large pattern of students brought a predisposition to class with them (Randler & Bogner, 2007) concerning the use of plants and concrete. I was please to observe that the students learned during the project the importance of understanding habitat alteration, as this is one of the biggest threats to the environment. All of the students were open to talking about saving water. They have always been very vocal at school (mostly in a positive way). This may be due to them being the first two groups of students at our new school. There were no upper classmen to intimidate them when they were freshmen and sophomores.

Any future studies need to be of longer duration and perhaps conducted by someone other than their teacher. The study went smoothly and there were no immediate problems. However, if this study were to be recreated and were to last longer, the students might want to actually plant the

garden. That could entail more supplies. Also, the scale needs more than just four choices for student answers. A wider range would allow for a better look at the slight variations shown here.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Included in Chapter Five was a presentation of the conclusions gleaned as a result of completing the project. Further, the recommendations extracted from the project are presented. Lastly, the Chapter concludes with a summary.

Conclusions

The conclusions extracted from the project follows:

1. The study was not long enough. There may have been an overlap of opinion from the pre-test survey to the post-test survey. The students in the experimental cohort were just beginning to grasp how to do the service learning project, and then it was finished.
2. The students may have chosen answers in their surveys based on what they had previously been taught by me in class. This would account for the similarities in answers.
3. Most of the students wanted to learn outside. This implies that the teaching and learning

going on inside the classroom may not be as effective as I would like.

4. Service learning projects, with their emphasis on hands-on work and community service, would be successful in future programs. There was a strong desire on the part of the students to learn in this manner.

Recommendations

The recommendations resulting from the project follows:

1. A study that lasts for several months with periodic surveys to assess the students' opinion and knowledge throughout the project. The project should include getting the hands dirty. Students might enjoy working to the conclusion of a community problem.
2. Starting the study at the beginning of the school year would minimize the bias the students have concerning the teacher. Another recommendation is that the study be done by someone other than the classroom teacher.
3. Spend more time doing activities outside the classroom. The simplest activity can be done

this way. Project WILD has many such activities (Project WILD, 2006).

4. Continue with the school garden and let it develop into an outdoor program encompassing the whole campus.

Summary

Chapter Five reviewed the conclusions extracted from the project. Lastly, the recommendations derived from the project were presented.

APPENDIX A
CONSENT FORM .

CONSENT FORM

The Use of an Environmental Education Service Learning Project to Enhance Student Motivation in a Secondary School

Investigator: Mary O'Connell

Introduction

The study in which your child is being asked to participate is designed to investigate different teaching strategies toward environmental education for secondary (high school) students. This study is being conducted by Mary O'Connell under the supervision of Dr. Herbert Brunkhorst, Ph.D., Department Chair, Science Education and Biology, California State University, San Bernardino. This study has been approved by the Institutional Review board, California State University, San Bernardino.

Purpose

The purpose of this study is to assess the prior and subsequent understanding of the balance of competing effects on the environment (including human impact) using an ordinary lesson plan versus applying what is learned using a service learning project (landscaping using drought-tolerant plants and alternative energy). Students who use hands-on learning may be capable of greater understanding and retain the knowledge they acquire. Standard lesson plans can include directed instruction from the teacher (e.g. lecture), reading the textbook, answering a set of questions about the subject, and then taking a test (including multiple choice, short answers, true – false, and essay). However, students who gain knowledge through the process of applying information may become more involved in their education and have a better chance of staying motivated in school and graduating.

Description

One group of students will be the control cohort and will receive information on the balance of competing effects on the environment in the usual manner. This will include:

- The teacher will lecture from the chapter.
- The students will answer the questions at the end of the chapter.
- The students will prepare for a unit test.

The other group of students will act as the testing cohort and will work on a service learning project on the balance of competing effects on the environment, which will include:

- Designing and building a model of a garden using:
 - Xeriscape (planting drought-tolerant plants).
 - Using alternative energy to run electrical components of the garden.

- Present their ideas and models to a group of teachers.

Both cohorts of students will do a pre-test and a post-test that will assess what they understand about the balance of competing effects on the environment and service learning projects both before the unit and after the unit.

Participation

Participation in the research study is voluntary. You are completely free to choose whether or not to allow your child to participate. You may choose to end your child's participation at any time during the duration of the study. Ending participation will not subject your child to any penalty or loss of grade. Your child is being asked to participate in this project because he or she is a student in Ms O'Connell's Advance Placement Environmental Science class.

Confidentiality

All information will be strictly confidential. The test will have your child's student identification number on it and not their actual name. The only purpose of the use of the student identification number is if there is a need for clarification on the pre-test or post-test. This will add secure confidentiality to your child's participation. All paperwork will be in a secure location that only the investigator has access to.

Duration

The duration of the research study will run for two weeks. Students will take the pre-test on the first day and the post-test on the last day. The remaining days in-between will consist of the procedures of the study.

Risks

There are no known risks of participation. Students will not receive a higher or lower grade for their answers to the pre-test and post-test assessment. The tests will only be used for analysis of the research question.

Benefits

The benefit of this research study may prove useful planning future lessons for students.

Video/Audio/Photograph

There will be no videotaping, audio taping, or photographs taken of the students during this research study.

Contact

You may contact Ms O'Connell's advisor, Dr. Brunkhorst, if you have questions about the research or your child's rights. Dr. Herbert K. Brunkhorst, Ph. D., Department Chair, Professor, Science Education and Biology,

California State University, San Bernardino, 5500, University Parkway, San Bernardino, CA 92407-2393, hkbrunh@csusb.edu, (909) 537-5613.

Results

The results of the research study will be published as part of Ms O'Connell's Master of Arts thesis only and not in a journal. After the study has been completed you may obtain the results of the study from the thesis which will be on file at California State University, San Bernardino.

Parent/Guardian Signature: _____ Date: _____

Student Signature: _____ Date: _____

APPENDIX B
DEBRIEFING STATEMENT

Debriefing Statement

The Use of an Environmental Education Service Learning Project to Enhance Student Motivation in a Secondary School

The study you have just completed was designed to investigate the use of an environmental science learning project to create a better understanding of the balance of competing effects on the environment. In this study there were three biases: that balancing of the environment includes humans; that humans have a direct impact on the environment; and that motivation plays an integral part in student learning. In this study we looked at these different components and their relationship.

Thank you for your participation and for not discussing the contents of the pre-test and post-tests with other students. If you have any questions about the study, please feel free to contact Mary O'Connell or Dr. Brunkhorst, Ph.D., at California State University San Bernardino at (909) 537-5613. If you would like to obtain a copy of the group results of this study, please contact Dr. Brunkhorst, Ph.D., at California State University San Bernardino at (909) 537-5613 at the end of Fall Quarter 2009.

APPENDIX C

PRE-TEST FOR: THE USE OF AN ENVIRONMENTAL
EDUCATION SERVICE LEARNING PROJECT TO
ENHANCE STUDENT MOTIVATION IN A
SECONDARY SCHOOL

Pre-test for: The Use of an Environmental Education Service Learning Project to Enhance Student Motivation in a Secondary School

The purpose of this pre-test is to assess your prior knowledge and understanding of environmental education, service learning projects, and the balance of competing effects on the environment. Your responses to the statements in this pre-test, along with your responses to the statements in the post-test, will aid in understanding the usefulness of service learning projects. Your participation in this is voluntary and confidential. Please attempt to answer all of the statements by circling the appropriate response. This pre-test should only take you about 10 minutes to complete.

Instructions

From the following statements, choose and circle whether you strongly agree, agree, disagree, or strongly disagree with the statement.

Pre-Test

1. Environmental education involves the students working outside of the classroom.
Strongly Agree Agree Disagree Strongly Disagree
2. Environmental education can only be used in science classes.
Strongly Agree Agree Disagree Strongly Disagree
3. I enjoy having the opportunity to go outside the classroom to do school assignments.
Strongly Agree Agree Disagree Strongly Disagree
4. The education we get in classrooms has no application in the real world.
Strongly Agree Agree Disagree Strongly Disagree
5. If school was more "real," I would work harder.
Strongly Agree Agree Disagree Strongly Disagree

6. Service learning projects include applying what has been learned in the classroom to the real world.
Strongly Agree Agree Disagree Strongly Disagree
7. Students who use hands-on learning are more proficient in understanding the material being taught.
Strongly Agree Agree Disagree Strongly Disagree
8. Xeriscape involves only desert plants such as cactus.
Strongly Agree Agree Disagree Strongly Disagree
9. Schools should plant less grass and use more concrete and xeriscape.
Strongly Agree Agree Disagree Strongly Disagree
10. I would be willing to use xeriscape at home.
Strongly Agree Agree Disagree Strongly Disagree
11. The biggest threat to nature is the alteration of habitats.
Strongly Agree Agree Disagree Strongly Disagree
12. The balancing of nature means humans must take second place to the needs of nature.
Strongly Agree Agree Disagree Strongly Disagree
13. Humans can help nature by working in cooperation with the ecosystem that we live in and go to school.
Strongly Agree Agree Disagree Strongly Disagree
14. The plants in the desert are not attractive.
Strongly Agree Agree Disagree Strongly Disagree
15. I am comfortable telling others about how to save water.
Strongly Agree Agree Disagree Strongly Disagree

Thank you for your cooperation.

APPENDIX D

POST-TEST FOR: THE USE OF AN ENVIRONMENTAL
EDUCATION SERVICE LEARNING PROJECT TO
ENHANCE STUDENT MOTIVATION IN A
SECONDARY SCHOOL

Post-test for: The Use of an Environmental Education Service Learning Project to Enhance Student Motivation in a Secondary School

The purpose of this post-test is to assess your continuing knowledge and understanding of environmental education, service learning projects, and the balance of competing effects on the environment. Your responses to the statements in this post-test, along with your previous responses to the statements in the pre-test, will aid in understanding the usefulness of service learning projects. Your participation in this is voluntary and confidential. Please attempt to answer all of the statements by circling the appropriate response. This post-test should only take you about 10 minutes to complete.

Instructions

From the following statements, choose and circle whether you strongly agree, agree, disagree, or strongly disagree with the statement.

Post-Test

1. Environmental education involves the students working outside of the classroom.
Strongly Agree Agree Disagree Strongly Disagree
2. Environmental education can only be used in science classes.
Strongly Agree Agree Disagree Strongly Disagree
3. I enjoy having the opportunity to go outside the classroom to do school assignments.
Strongly Agree Agree Disagree Strongly Disagree
4. The education we get in classrooms has no application in the real world.
Strongly Agree Agree Disagree Strongly Disagree
5. If school was more "real," I would work harder.
Strongly Agree Agree Disagree Strongly Disagree

6. Service learning projects include applying what has been learned in the classroom to the real world.
Strongly Agree Agree Disagree Strongly Disagree
7. Students who use hands-on learning are more proficient in understanding the material being taught.
Strongly Agree Agree Disagree Strongly Disagree
8. Xeriscape involves only desert plants such as cactus.
Strongly Agree Agree Disagree Strongly Disagree
9. Schools should plant less grass and use more concrete and xeriscape.
Strongly Agree Agree Disagree Strongly Disagree
10. I would be willing to use xeriscape at home.
Strongly Agree Agree Disagree Strongly Disagree
11. The biggest threat to nature is the alteration of habitats.
Strongly Agree Agree Disagree Strongly Disagree
12. The balancing of nature means humans must take second place to the needs of nature.
Strongly Agree Agree Disagree Strongly Disagree
13. Humans can help nature by working in cooperation with the ecosystem that we live in and go to school.
Strongly Agree Agree Disagree Strongly Disagree
14. The plants in the desert are not attractive.
Strongly Agree Agree Disagree Strongly Disagree
15. I am comfortable telling others about how to save water.
Strongly Agree Agree Disagree Strongly Disagree

Thank you for your cooperation.

APPENDIX E

DATA TABLE

Data Table

Item Description	Control (n=23)				Experimental (n=21)			
	Pre		Post		Pre		Post	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Environmental education involves the students working outside of the classroom	3.17	.388	3.13	.626	3.38	.498	3.33	.483
Environmental education can only be used in science classes	1.91	.668	1.91	.417	1.81	.814	2.10	.944
I enjoy having the opportunity to go outside the classroom to do school assignments	3.48	.511	3.52	.511	3.62	.590	3.71	.561
The education we get in classrooms has no application in the real world	1.91	.793	2.22	.736	1.76	.625	1.48	.814
If school was more "real," I would work harder	2.87	.694	2.61	.722	3.05	.805	3.33	.483
Service learning projects include applying what has been learned in the classroom to the real world	2.87	.344	3.00	.426	3.38	.498	3.10	.301
Students who use hands-on learning are more proficient in understanding the material being taught	3.26	.689	3.04	.562	3.62	.498	3.52	.602
Xeriscape involves only desert plants - such as cactus	2.35	.573	2.43	.662	3.05	.805	2.43	.811
Schools should plant less grass and use more concrete and xeriscape	2.00	.853	2.30	.926	2.57	1.207	2.67	1.017

Item Description	<u>Control</u> (n=23)				<u>Experimental</u> (n=21)			
	Pre		Post		Pre		Post	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
I would be willing to use xeriscape at home	2.35	.647	2.35	.487	2.95	.805	2.48	.928
The biggest threat to nature is the alteration of habitats	2.74	.619	3.00	.674	2.71	.902	3.33	.658
The balancing of nature means humans must take second place to the needs of nature	2.96	.638	2.87	.548	2.81	.680	2.71	.644
Humans can help nature by working in cooperation with the ecosystem that we live in and go to school	3.26	.541	3.00	.426	3.29	.561	3.43	.507
The plants in the desert are not attractive	2.57	.896	2.78	.795	2.95	.973	2.29	1.056
I am comfortable telling others about how to save water	3.00	.674	3.00	.522	3.38	.590	3.60	.503

You can add the necessary number of rows and then when all the data are in you can hide the lines to be consistent with the thesis formatting.

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