AN EVALUATION OF THE NATIONAL WILDLIFE FEDERATION'S® SCHOOLYARD HABITAT PROGRAM® IN THE HOUSTON INDEPENDENT SCHOOL DISTRICT

ENVIRONMENTAL EDUCATION, INTEGRATED CURRICULUMS AND ACADEMIC STANDARDS

THESIS

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CHAPTER I

INTRODUCTION

Over the past few decades there has been a fervent interest in incorporating non-traditional environmental educational devises into the academic core of secondary schools. The development of these alternative curriculums was due to a rising awareness of environmental issues. In his introduction to the Organization for Economic Co-operation and Development's (OECD) publication *Environment, Schools and Active Learning,* Posch (1991) defined sustainable development as, "development that is not using up the wealth of the past, and living at the cost of the future" (p. 11). To understand sustainable development, an understanding of environment was essential. There is the world around us, the functional world as it relates to people, and then there is a complex ecological system which we are a part of, and to which our fate is inextricably bound to (Posch, 1991). The Ubuntu Declaration on Education and Science and Technology for Sustainable Development was a rally call, in September of 2002, by 11 of the world's foremost global educational organizations for "greening of school curriculums" (United Nations University / Institute of Advanced Studies [UNU/IAS], 2002, p. 1). Its primary message is "an effort to make integrated solutions work for sustainable development and to mobilize the education sector to contribute to sustainable development" (UNU/IAS, 2002, p.2).

One of the difficulties that face the education system, particularly in the U.S., is the ability to incorporate an integrated curriculum into primary and secondary schools

while satisfying national and state educational standards. Courses with non-traditional elements integrated into their curriculum would have to be challenging, integrative, and exploratory (Pale, Thompson, Keyes, 2001). Pale et al. (2001) asked the question "can curriculum integration survive in an era of high stakes testing?" (p. 7). According to the findings of *State Education and Environment Roundtable* (SEER) held in San Diego in 1999 published under the title *Closing the achievement gap: Using the environment as an integrated context for learning* (Lieberman & Hoody, 1998), curriculum integration in K-12 schools would not only survive, but would be a necessity in satisfying requirements set by national and state benchmarks.

An example of an integrated curriculum using the environment as the context for learning in K-12 schools is the National Wildlife Federation's® (NWF®, 2001) *Schoolyard Habitat Program® (SYH Program®)*. Created by the NWF® in 1996, the intention of the *SYH Program*® was to help interested K-12 schools and communities create and restore wildlife habitats on school grounds. The goal of the SYH Program® was to create a cross-curricular learning environment while teaching about wildlife habitat and conservation (NWF®, 2001, p.2). No specific evaluation had been done thus far on its educational effects.

Problem Statement

The research problem was to determine whether the *Schoolyard Habitats Program*® was an effective curriculum, based upon Texas and national academic standards.

Purpose and Objectives

The purpose of this study was to determine whether the *SYH Program*® had an effect on primary school students' motivation to learn and their ultimate academic achievement.

Specific objectives of the study were:

1. Determine if the SYH Program® was associated with the academic achievement of students based upon their TAKS scores

2. Determine if the SYH Program® was associated with the student samples motivation to learn, based upon their attendance records.

3. Determine if there was a difference in academic achievement of those students that participated in the SYH Program® based upon the demographic variables of gender, ethnicity, and economic status.

Delimitations

This study did not include students from all regions of Texas, but only those selected schools located in the Houston Independent School District (H.I.S.D.).

Definition of Terms

Integrated curriculum: For the purposes of this study, integrated curriculum was any curriculum that used an interdisciplinary approach to teaching and a student-centered approach in which students are invited to join with their teachers in planning their learning experiences.

The Environment as an Integrating Context for Learning model™(the EIC model™): "A framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning" using the environment as the context (Lieberman & Hoody, 1998, p. 1).

National Wildlife Federation®: U.S. largest member supported conservation group dedicated to protecting wildlife and the environment.

Schoolyard Habitat Program®: Created by the NWF® in 1996, the intention of the *SYH Program*® was to help interested K-12 schools and communities create and restore wildlife habitats on school grounds. The goal of the SYH Program® was to create a cross-curricular learning environment while teaching about wildlife habitat and conservation (NWF®, 2001).

Texas Assessment of Knowledge and Skills (TAKS): The TAKS test scores assess the student achievement of Texas Essential Knowledge and Skills (Texas Education Agency [TEA], 2005).

Texas Essential Knowledge and Skills (TEKS): The state of Texas's curriculum goals (TEA, 2005).

Academic achievement: Variable measured in this study, based upon TAKS tests scores which represent the students understanding of the state of Texas's curriculum goals, the TEKS.

Motivation to learn: Variable measured in this study, using attendance rates as an indicator of the students' willingness to participate in school and be enthusiastic about the curriculum.

Basic Assumptions

It was assumed that all the students in this study were typical students not representing unusual cases within the primary school system.

It was assumed that all teachers participating in this study fulfilled the requirements of the *SYH Program*® to their fullest potential.

It was assumed in this study that the TAKS were an accurate measurement of academic achievement.

It was assumed in this study that attendance rates were accurate measurements of students' motivation to learn.

Limitations

This study did not include variables other than TAKS scores and demographic variables gender, ethnicity, and economic status as contributing factors to academic achievement.

This study did not include variables other than attendance as contributing factors to motivation in primary school students.

CHAPTER II

REVIEW OF LITERATURE

Integrated Curriculums

A. History of Integrated Curriculums

The history of integrated curriculums in the U.S. can be traced back to education reform that began in the 19th century following the advent of the industrial revolution; particularly the educational theories and practices developed by those in the realm of vocational education as opposed to traditional education. Often considered the forefather of vocational education, Booker T. Washington, was one of the first educators to see the value in both cognitive and problem-solving skills that lay in sharp contrast to rote memorization and academics which were often attributed to traditional education practices (Gordon, 2003). The *First Morrill Act of 1862* and the advent of the land-grant institution further brought vocational education to the forefront as part of formal education (Gordon, 2003).

The history of education in the 20th century can be seen as a battle between the progressive education movement and traditional education. In the early 20th century academic subjects such as Greek, Latin and history were being phased out of the classroom, as they were perceived by many in the progressive education movement as impractical in a world altered by the industrial revolution. There was still an academic core, but this was intended to be for the minority that were college-bound, whereas a

differentiated curriculum was being formed to stratify most of the student body so as to direct them towards their likely future occupations (Ravitch, 2000). This type of utilitarian approach to education was later referred to as the curriculum of "social efficiency" created by Bobbitt and Charters in the 20's (Ravitch, 2000), and further refined by Prosser in the 40's with the new title of "the life adjustment movement" (Gorden, 2003; Ravitch, 2000). It is important to realize however that the progressive movement was not entirely geared in this direction. John Dewey, often considered the father of the progressive movement, had a broader perspective on education. Whilst the form of progressive education referred to previously is an attempt to channel pupils into a vocation to support the greater social mechanism Dewey was more concerned with the development of the individual in the social context (Dewey, 1916). His idea of education, as could be witnessed in his pilot school, was "child-centered" and "activity based". Education is a response to the needs of the children within the context of the current culture experience. "The continuity of any experience, through the renewing of the social group, is a literal fact. Education, in its broadest sense, is the means of this social continuity of life" (sic) (Dewey, 1916, pp. 33).

"Integrated" or "interdisciplinary" education was on the forefront of pedagogical thought in the early part of the 20th century. *Integration: It's Meaning and Application* was the focus of the 1935 yearbook for the National Education Association (NEA), and in 1958, the National Society for the Study of Education (NSSE) published *The Integration of Educational Experiences* (Goodlad, Wineburg, Grossman, 2000). Definitions of "integrated" or "interdisciplinary" education have differed over the last century and in some ways make research difficult. The 1958 NSSE yearbook defines

integrated education as the integration of experiences within a single course (Goodlad et al., 2000). Arthur N. Applebee defines an integrated curriculum as occurring when "students discover interrelationships across all of the elements in the curriculum, so that the parallel but independent discussions of an episodic curriculum begin to echo back on one another" (1996, p. 77).

The Lincoln School, a pilot school based upon Dewey's ideas, at Teachers College in Chicago was developed in 1919 by Eliot and Flexner, members of the General Education Board. It was designed to promote his progressive "child centered" educational approaches (Ravitch, 2000, p. 177). The integration movement at the Lincoln School focused on the socialization of the student by developing every aspect of the student be it intellectual, physical, emotional, aesthetic, or ethical (Ravitch, 2000). Other schools following this trend included Play School in New York, the Walden School in New York, Shady Hill in Cambridge, and the Park School in Baltimore (Ravitch, 2000). The majority of present day work in the field on interdisciplinary methods of teaching came out of the tenets of cognitive psychology and philosophy (Presseisen, 1986; Prost, Humphreys, Ellis, Buggey, 1997). Presseisen (1986) categorized the thinking processes into four categories, essential cognitive processes, higher-order cognitive processes, meta-cognitive processes, and epistemic cognitive processes. As it relates to integrated or interdisciplinary education, epistemic cognitive processes have the most relevance. Presseisen said "the kinds of thinking related to particular bodies of knowledge or subject matters and the particular problems addressed by these knowledge areas as well as the interdisciplinary relationships among content areas" (Presseisen, 1986, p. 9). Perkins viewed epistemic cognitive processes (Presseisen, 1986) as a means

of internalizing the meaning of information by providing a context for its use. Sternburg saw the need for the development of the epistemic cognitive processes in helping the student transfer knowledge to different content areas (Presseisen, 1986). Gardner (1993) further advanced the field of cognitive psychology by bringing into question the validity of I.Q. tests, created by psychologist Alfred Binet in the early 20th century, used for purposes of recruitment in World War I, and promoted and adopted by educators in the U.S. (Gardner, 1993; Ravitch, 2000). He critiqued the I.Q. test as being too narrow in perspective since they only measured two types of intelligence: linguistic and logical-mathematical (Gardner, 1993). Gardner (1993) proposed that there are seven intelligences: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal. This theory of multiple intelligences would imply the need for an education that catered to the individual in order to determine their proclivities. In order for such a curriculum to exist, the "uniform view" of a core curriculum with set facts geared towards standardized tests like the SAT or IQ test would need to be bypassed in favor of an integrated curriculum that uses more electives and "projects" to uncover the various intelligences (Gardner, 1993).

There seems to be a connection between integrated studies and the exercise of different human faculties throughout the last century. Whether it be the Lincoln School's focus on the development of the whole individual (Ravitch, 2000), or Gardner's (1993) ideal curriculum based upon the "multiple intelligences", the student as well as the subject matter is a complex set of interrelating elements. Furthermore, the current trend of constructivism in the last few decades, which contends that knowledge is built by the individual within the context of his or her own activities, particularly prior knowledge,

would indicate a straying from a traditional academic core which relies more upon the direct transfer of knowledge between teacher and pupil (Prost et al., 1997; Ravitch, 2000). Recent curriculum development research would support this trend. The book *Interdisciplinary approaches to curriculum* (Prost et al., 1997) would have the teacher's role be that of a facilitator, or conductor that would orchestrate a series of activities designed to motivate the students to build knowledge through planning, cooperative investigations, and resource. The relevance, timeliness, and relatedness of the subject matter would inspire this proactive behavior.

The social nature of learning is important to the constructivist approach. Applebee (1996) sees the transfer of knowledge as gained by students entering into ever-changing cultural traditions he refers to as "conversations". Meaningful contributions do not necessarily arrive "on their own" but can be attained with the help of others (Applebee, 1996). This is also referred to by Vygotsky as the "zone of proximal development" (Applebee, 1996). Wiggins & Mctighe (1998) further the idea of teacher as facilitator in their work *Understanding by design.* Curriculums should be designed in a backwards process with the desired results identified at the beginning. With clear goals set, the teachers are free to explore the essential questions needed to attain them. Like Gardner's (1993) multiple intelligences, Wiggens & Mctighe (1998) suggest six facets of understanding to assess student understanding: explanation, interpretation, application, perspective, empathy, and self-knowledge. This form of assessment would require an integrated or interdisciplinary approach to learning.

B. Current Examples of and Research on Integrated Curriculums

"Despite the popularity of interdisciplinary curricula across the nation, there is no body of evidence that attests to greater learning in high-quality interdisciplinary versus high-quality disciplinary classrooms" (Goodlad, et al., 2000, p. 12). This same study cited a survey by Calwelti that two-thirds of 10,000 schools surveyed had implemented or planned to implement interdisciplinary curricula (Goodlad et al., 2000). Goodlad et al. (2000) noted that there is a lack of data not only on the success of integrated curriculums, but in how it is defined differs greatly from school to school, as well as how teachers from different backgrounds, culturally and academically, interpret and implement integrated curriculums. This state of affairs often leaves it in the hands of researchers to determine whether they are studying valid examples of integrated curriculums.

One of the binding elements of most integrated curriculums is the "project method" which recalls the progressive education era and the Chicago and Lincoln Schools (Applebee, 1997; Gardner, 1993; Ravitch, 2000). Studies revolve around projects or activities, which, by their very nature, integrate different disciplines. The Key School, a public "options" school in downtown Indianapolis, is a K-6 elementary school modeled after the multiple intelligence theories of Howard Gardner (1993). Constructivist in nature, assessment of students is based on the evaluation of student portfolios, as opposed to tests (Gardner, 1993). The portfolios are viewed in 5 different dimensions: the individual profile, mastery of facts, skills, and concepts, quality of work, communication, and reflection (Gardner, 1993). Students, in essence, learn the skill of research at a young age, which requires not only the ability to integrate subject matter,

but also the ability to communicate ideas and tap different cognitive skills, particularly the “meta-cognitive” skill of self-reflection (Gardner, 1993).

Pale, Thompson, & Keyes (2001) reviewed an integrated curriculum at Clark Middle school in Atlanta referred to as the Community Context Curriculum Project (CCCP). Its basic tenant was “real life situations as opposed to formal academics” (p. 35). Students kept professional logs about local businesses, wrote letters of inquiry, built community concept maps, and wrote resumes. Students integrated various skills from the core curriculum to achieve this. One of the basic tenants at Clark Middle School is that society expectations and standards are multivariate and lesson plans should reflect this (Pale, et al., 2001).

In 1981 the United States Department of Agriculture (USDA) established Agriculture in the Classroom (USDA/AITC, 2004). The objective of the curriculum was to educate schools in agricultural and environmental matters by providing a “flexible educational program designed to supplement and enhance existing curriculum” (USDA/AITC, 2004, p. 2). The AITC (2004) supplies a wealth of teacher resources for K-12 teachers, including lesson plans that integrate different subject matters. For instance, a lesson plan called “Where does it come from?” geared towards 4-6 grades would integrate social studies, math, and language arts. The purpose of this particular lesson plan would be to use the National Agriculture Statistics Service (NASS) data to determine where commodities in common snack foods are grown (USDA/AITC, 2004).

In a study of a successful high school, fictionally named La Salle High School, Kliebard (2002), looked at elements that sustained such an institution. The approach to knowledge and teaching at this school had an interpretive quality. The curriculum

reflected a traditional subject-based framework, and stressed academic achievement but it also had electives that were similar to independent research classes at college levels. The point was to engage students by helping them integrate the knowledge learned in the core curriculum to personal interests (Kliebard, 2002). Also, within the core classes themselves, students were expected think like researchers. For instance, in U.S. History class, students would be presented with two hypotheses regarding a historical trend and were required to uncover the material needed to establish which hypothesis may be more appropriate. (Kliebard, 2002). Learning by doing seems to be a common thread in the integrated curriculum approach, regardless of style.

Environment as an Integrated Context for Learning (EIC)

A. History of Environmental Education

The term "environment as an integrated context for learning" or EIC was coined by the *State Education and Environmental Roundtable* in 1994 (Lieberman & Hoody, 1998) as an attempt to quantify the use of environmental elements in classroom scenarios using hands on, project oriented activities. EIC is "a framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning" (Lieberman & Hoody, 1998, p. 1), using the environment. Most of the value placed upon an EIC curriculum before it was coined has never really been quantified, at least in the U.S.. Up until the study done by the Roundtable, environmental integration into the core curriculum was only valued based upon personal observation rather than by quantifiable research (Lieberman & Hoody, 1998).

Over the last part of the 20th century, environmental concerns have evolved in a myriad of ways, and so has the K-12 educator's response to these concerns. The terms "environment", "environmental education" (EE), "environmental literacy", among others were probably not in the general vocabulary of the public until the 1960's (Disinger, 2001). During the earlier part of the 20th century, particularly during the 30's, there was nationwide debate concerning the misuse or overuse of natural resources and those discussions trickled into K-12 classrooms usually in the form of conservation education (Disenger, 2001).

Conservation education was usually a sideline or supplemental part of science classes to help students learn conservation on a personal level and not on socio-political level (Disenger, 2001). The conservation education movements became more prevalent in schools following World War II and were often promoted by government agencies that saw a link between sound natural resource management and the growing economy. In other words, there were few disparities between learning about beauties of nature and the technological advancements of business and industry of the time (Disenger, 2001).

An environmental movement started to take hold in the 60's. This movement was often considered to be heralded in by Rachael Carson's book *Silent Spring*, which exposed the dangers of the insecticide DDT, and questioned humanities reliance on technological advancements, especially those made at the expense of the environment (Carson, 1962). As opposed to the conservation movement, the environmental movement focused more on human impacts on the environment, and schools were seen as a good place to get this message out; the hope was to teach children to take active roles in the stewardship of the environment (Disenger, 2001). The "activist" slant to education was

very much in line with the new experimental and neo-progressive movements of the 60's and 70's (Ravitch, 2001). The first official definition of Environmental Education (EE) was: "Environmental Education is aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution" (Stapp, 1969, pp. 31-32). Since then, the definition has been modified to suit the needs of the definer and more recently has evolved to include concepts such as group responsibility, critical thinking abilities, problem solving, engagement and motivation (Disenger, 1998).

During the late 70's, 80's and 90's, the environmental movement drew fire from critics, mostly due to the strong regulatory powers that the Environmental Protection Agency (EPA) was afforded over industry and the significant growth of environmental Non Government Organizations (NGOs) who had considerable lobbying power in congress (Fields & Fields, 2001). Along with this political momentum came a backlash to EE. Jon Hug (1977), an environmental educator, argued that a distinction between EE and environmentalism should be drawn, and activism should be left out of the classroom in place of "value fair" or "value free" observations of environmental issues.

In the 90's, the criticism of EE became much more focused. Most of the criticisms seem to come from economists and scientists who regarded the environmental movement as too emotion-laden and not based enough on scientific evidence (Disenger, 1998). Just as concerned with EE during the 90's were the educators themselves. The major concern was similar to opponents of EE in that there was concern that academic rigor was not reflected in EE teaching practices (Disenger, 1998). Two independent commissions were formed in the 90's to tackle this perceived problem. One, organized

by the George C. Marshall Institute, called the Independent Commission on Environmental Education (ICEE), did a nationwide review of EE curriculums and made the following recommendations:

- "Environmental educators should shift their primary emphasis to the acquisition of knowledge (rather than superficial, politically charged presentations), provide substantive content in natural science, and begin their study of science with the study of the natural world.
- Textbooks and other instructional materials should be peer reviewed while under preparation and also just before adoption, with input from scientists, economists, and other experts, in addition to parents and teachers.
- Professional educational and scientific organizations should endorse instructional materials only after rigorous review.
- A multidisciplinary capstone course in environmental studies should be developed and institutionalized in secondary schools.
- Teachers of environmental studies should receive substantive preparation in natural science, economics, and mathematics." (Disenger, 1998, 8-9).

The other independent commission of note, made up of professional environmental educators, was the North American Association for Environmental Education (NAAEE) (Disenger, 1998). Over a period of two years, starting in 1996, the NAAEE released three volumes under the title *Environmental Education: Guidelines for Excellence* which were evaluations of EE teaching materials designed to help instructors promote the development of environmental literacy (Disenger, 1998). Environmental literacy as defined by its inventor Roth (1992) as "essentially the capacity to perceive and

interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems" (p. 4). The six categories, as laid out by the NAAEE in their evaluations are:

- "Factual accuracy and balanced presentation of differing viewpoints and theories.
- Depth, with a focus on concepts in context.
- Emphasis on skills building, stressing application of critical and creative thinking to issues.
- Action orientation, encouraging the sense of personal stake and responsibility and strengthening learners' perceptions of their personal ability to influence a situation.
- Instructional soundness, with emphasis on interdisciplinary, learner-centered instruction.
- Pedagogic usability, involving clarity, logic, and connections to other educational requirements" (Disenger, 1998, p. 9).

As to how these two evaluations of EE have affected the overall quality of EE in secondary schools is still to be learned. For the most part, the existence of an environmental studies class in secondary schools curriculum is virtually non-existent, and EE is relegated to an "idea" that is integrated into various subjects (Disenger, 1998). However, integration of EE into the core curriculum and EE as an interdisciplinary study is viewed as important in a number of studies (Ramsey, 1997; Simmons, 1998; Stapp, 1969; Volk, 1993). EIC seemed the logical paradigm shift in viewing EE, because of the distance EE has held in regards to primary and secondary core curriculums, and to prove

itself as an effective curriculum with regard to recently instituted state standards (Leiberman & Hoody, 1998).

B. Recent Studies in and Examples of EE and EIC Curriculums

Clark Middle School (Pale et al., 2001), has another integrated program besides the CCCP mentioned above. It is the *A Walk through the Watershed Project* in which 7th grade science students learn about and create community awareness of the Atlanta watershed. The project is divided into three phases: the first phase is a tour of the environment, the second involves researching particular aspects of the environment, and the third phase lets individuals research their own river area (Pale et al., 2001). This developmental, directed style of research is akin to the ideas presented by Applebee (1998) where a student learns first with the help of others, in a social context, and then is able to more effectively research on his/her own.

An example of a truly integrated approach to teaching and learning using the environment (McFaden, Nelson, Randall, 1996) involved students from Thomas Jefferson High School for Science and Technology, (Alexandria, Virginia) studying species that inhabited the Mason Neck Park using technology created they created themselves. The class schedule was clustered around this project, putting biology, English, social studies, and technology classes back to back with each teacher aware of the other's program (McFaden et al., 1996). Using the core curriculum as a knowledge base and then applying skills to the "real-world" was the focus. As with the Clark Middle School example (Pale et al., 2001), there was a community outreach element as well,

where students were free to use whatever resources were available in the community to help them (McFaden et al., 1996)

Another good example of an EIC curriculum is called the *Edible Schoolyard Program* of the Martin Luther King Jr. Middle School in Berkley, California (*The Edible Garden*, 2004). The objective of the program, which is integrated into the student's daily life, is to teach ecological principles by using a garden ecosystem. The program teaches the cycle of food production, nutrition, sustainable principles, and a general respect for living things (*The Edible Garden*, 2004). The teaching plan itself is referred to as the *From Seed to Table* program because of the progression from garden to kitchen to meals in the classroom. "Lessons taught in the classroom are enriched by hands-on garden and kitchen activities, while concepts that arise in the kitchen and garden are meaningfully discussed in the classroom. The settings are most productive when linked, and foster students' multileveled understanding of the natural world" (sic) (*The Edible Garden*, 2004, p. 1).

Very similar to the *Schoolyard Habitat's Program*® is *Project Wild*®, which is a conservation and environmental education resource administered by Council for Environmental Education (CEE) for teachers and students in the K-12 grade levels (*Project Wild*®, 2004). *Project Wild*® provides a curriculum and activity guide book for educators to supplement or integrate into their classroom. The lesson plans and activities are geared to align well with the subject areas of social studies, language arts, science, math, expressive arts, and environmental education (*Project Wild*®, 2004). Like *The Schoolyard Habitat's Program*®, *Project Wild*® curriculums are designed to be on par with national and state educational standards (*Project Wild*®, 2004). *Project Wild*® also

provides environmental and conservation links for students and educators (*Project Wild®,* 2004).

In a somewhat related field, a study of intergenerational and intercommunity learning in Costa Rica (Vaughn, Solorazano, Gack, Ray, 2003), found that there was a significant difference between children that learn and retain conservation principles in the school environment and transfer them to their parents, and those that did not. Within the treatment group there was a sub-set of children that used outdoor activities and interactive games to help retain knowledge, and transfer this knowledge to their parents. This group had statistically higher rates of knowledge transfer compared to the other groups (Vaughn et al., 2003).

In a related study (Pigg, 2003), the effects of gardening and the *Junior Master Gardener*™ program (JMG™), was observed on academic achievement in math and science in 3rd, 4th, and 5th graders. The JMG™ is a Texas Agricultural Extension Service program designed to teach youth about horticulture, nutrition, health, environmental studies, and leadership skills (Pigg, 2003). The results of this study indicated that there was no difference in using traditional teaching styles and integrating the JMG™ program into the students' curriculums with respect to science achievement. For math, the students in the traditional control groups actually performed better on their science TAKS examinations than those in the treatment TMG™ program (Pigg, 2003).

In another study similar to Pigg's (2003), the JMG™ program was looked at again with respect to its effects on primary school students' math and science achievement (Klemmer, Waliczech, Zajicek, 2005) . In this case there was a significant relationship between improved math science achievement and those students that used

the JMG™ program as opposed to students who used more traditional styles (Klemmer et al., 2005).

Environmental Education and Academic Standards

A.History of Education Standards in the U.S.

The issue of setting standards in primary and secondary academic curriculums has been a subject of much heated debate in the U.S., particularly since the passage of the *No Child Left Behind Act of 2001* (107th Congress, Public Law 107-110). The subtitle of the act states: "To close the achievement gap with accountability, flexibility, and choice, so that no child is left behind" (107th Congress, Public Law 107-110, p.1). Of the three elements in this statement, it is "accountability" that is causing the most debate; a debate that has been going on for well over a century.

Much of this debate is over definition. What are standards? Whose standards? How do we assess these standards? Diane Ravitch in her book *National Standards in American Education* (1994) notes that some of the contention over standards is rooted in definitional problems. When speaking of standards are educators concerned over *content standards, performance standards,* or *opportunity to learn standards* (Ravitch, 1994, pp. 12-13)? *Content standards* are basically concerned with what teachers are supposed to be teaching and what students are expected to learn. *Performance standards* are concerned with the actual performance of the student in attaining the various benchmark levels as described by the content standards. These standards are measured by exams, reports, essays, and so forth. *Opportunity to learn standards* are those standards concerned with the resources available to schools such as staff, textbooks, and

programs made available by the district or state (Ravitch, 1995). Contention over academic standards stems from the interrelatedness of these three standards. Under the auspices of the No Child Left Behind Act 2001, now more than ever, schools are required to achieve high *performance standards* in order to ensure that the resources to attain them constitute what *opportunity-to-learn standards* will be granted by the state. Meanwhile the *content standards,* which are state interpretations of national standards and benchmarks, vary in breadth and depth from state to state. The *content standards* are represented by state mandated benchmark tests (eg. Texas Assessment of Knowledge and Skills (TAKS) in Texas), which are the only assessments required to determine student *performance standards* and ultimately the *opportunity-to-learn standards* (Ravitch, 1995; Meier, 2002). Furthermore, because of the new standards, many states are increasing the requirements and training of K-12 teachers. Many teachers are now required to pass tests in pedagogy and content which are aligned with new national and state standards (Whitaker, 2004). Ultimately, current K-12 education is federally mandated to compose curriculums that teach to the states' standardized tests, and many educators are flummoxed by the lack of options for educating students under this system (Meier, 2002; Whitaker, 2004).

How did we arrive at this point? K-12 education in the U.S. has never really embraced a national system of standards and assessments. However various factions have been trying to implement them in one form or another for quite some time. During the mid-nineteenth century the use of similar textbooks, shared curriculums in core academic subjects, and shared norms and expectations in teacher training were commonplace (Ravitch, 1995). These were not federally mandated however, but grew

more from a consensus among educators that due to the varying types of immigrants coming to the U.S. some kind of agreement over curriculum was important to gain a sense of social cohesion (Ravitch, 1995). College admission tests during this period were somewhat arbitrary and specific to the college the student was attempting to gain entrance to (Ravitch, 1995).

As a reaction to this disparity between public school curriculums and college entrance requirements many associations, including the Committee of Ten, were formed to create more uniformity in college standardized tests (Ravitch, 1995). The Committee of Ten, a panel formed in 1892 by the National Education Association, was one of the first of its kind to review public education curriculums and make suggestions on changes to a system that was perceived to allow too many electives and arbitrary courses. Ultimately, a more streamlined approach to curriculum development was suggested by the committee that would narrow the scope of what was required of public school students and prepare them for college entrance. The committee had a lot of influence on education in the late 19th century and many schools focused on their suggested subject list of: "Latin; Greek; English; other modern languages; mathematics; physical science (biology, including botany, zoology, and physiology); history, civil government, and political economy; geography (physical geography, geology, and meteorology)" (Ravitch, 1995, p. 38).

It was during this period of history that a divergence of philosophies occurred concerning the direction public education should take. On the one hand, there were the "traditionalists" represented by the Committee of Ten which held the belief that all children should have the opportunity to a classical liberal arts education regardless of

demographic background and the opportunity to enter college (Ravitch, 2000). On the other hand there were the "progressives" represented by another committee created by the NEA called the Commission on the Reorganization of Secondary Education (CRSE) (Ravitch, 1995). This committee made recommendations on vocational education, and non-academic concerns. It recognized that most children were not college-bound and thus should be taught skills that would be the most useful to society. The "seven cardinal principles", as the CRSE referred to them, were ""Health," "Command of Fundamental Processes," "Worthy home-membership," "Vocation," "Citizenship," "Worthy use of Leisure," and "Ethical Character"" (Ravitch, 1995, p. 41). To be fair, the "progressive" movement became split in its stance on education. Nothing could be more divergent than the "social efficiency movement" of David Snedding which espoused the use of education as a purely vocational track that accented the needs of the current industries, and John Dewey's view that although education ultimately has a vocational bent, it should accent the needs of the individual and favor a more intellectual, problem-solving approach (Gorden, 2001).

The push and pull of these various movements and reforms on education continued through the 20th century, but the use of standardized tests remained intact for college entrance and in the case of IQ tests in tracking a student's progress through the public school system (Ravitch, 1995; Whitaker 2004). The Standardized Aptitude Test (SAT), has remained the primary college entrance examination since its inception in 1926 (Ravitch, 1995). Its roots lie in the Intelligence Quotient (IQ) tests that became popular after World War I because of their perceived beneficial uses for stratifying army ranks based upon the results (Ravitch, 1995; Whitiker, 2004). Schools continue to use these

tests to determine the academic tracking of students to this day. The SATs were an adaptation of the IQ tests that not only measured an individual's analytical and linguistic abilities but also offered a psychologically profile of the individual's likelihood of finishing college (Meier, 2002). This utilitarian, scientific approach to educational assessment can be traced to the beginnings of the "progressive" movements of the early 20th century (Ravich, 2000).

It is primarily the results of these tests during the 70s that inspired a shockwave of fear in the educational community that education was failing public school children. Mean scores dropped by nearly 30 points in math and 50 points in verbal between 1967 and 1980 (Ravitch, 1995). There are many theories behind this decline in achievement, mostly regarding the fragmentation of curriculum and an offering of more non-academic choices as a result of the social upheaval of the time (Ravitch, 2000). The College Board refers to this period of 1967-1976 as the "decade of distraction" due to the Vietnam War, political assassination, and the existence of counter-culture movements. However, their study also cited the prevalence of non-academic curriculums and a lapse in disciplinary action on the part of teachers and administrations as a cause (Ravitch, 1995).

Whatever the reasons for decline in academic achievement, the report *A Nation at Risk* prepared by the National Commission on Excellence in Education (NCEE) is considered the rallying cry for improved standards in K-12 education, partly because of the attention given to it by the U.S. Department of Education (Ravitch, 1995). The report painted a pretty dismal picture of the state of public education, although it was not considered a fair assessment by all educators (Meier, 2000). It became the primary reason for school reform and the establishment of national standards for decades to come

(Ravitch, 1995). The creation of national standards by committees representing the various core studies soon followed.

In 1990, President Bush announced the *America 2000* project drafted by the White House and the National Governors Association which was intended to motivate schools to achieve higher standards of education. Although the raising of academic standards and closing the "achievement gap" was not a partisan issue, there was much contention over the delivery of standards (Meier, 2002; Ravitch, 1995). Under the Bush administration in 1991, the National Council on Education Standards and Testing (NCEST), a bipartisan panel, was created to form a consensus on the creation of a national test and national standards. Key to this plan was the idea that standards would be voluntary and not federally imposed. Under the Clinton administration Goals 2000 was altered to create state voluntary standards based upon national benchmarks (Ravitch, 2000). The Clinton administration's new federal agency that would certify national and state standards was the National Education Standards and Improvement Council (NESIC). This agency was responsible for the allocation of funds to states that completed education reform plans (Ravitch, 1995). These changes are the precursor for what would eventually be the passage of the *No Child Left Behind Act of 2001*. Under this act, the states are given power to give mandatory standardized tests in public schools to orchestrate student promotion and graduation. Improvement along these lines ultimately determine teacher salary, program funding or the *opportunity to learn standards* which schools needed to improve their performance standards (Meier, 2002; Ravitch, 1995).

B. Research in Environmental Education and Academic Standards

The view that environmental education (EE) integrated throughout the curriculum could lend extra weight to student achievement in public schools began to take shape in the 90s (Simmons, 2001). However, the bulk of studies on EE in the curriculum up until the Lieberman & Hoody (1998) study have had more to do with testing environmental awareness, ecological and environmental literacy, and evaluation and action skills in students, and less to do with how students performed on the tests they were required to complete for each particular subject area (Leeming, Dwyer, Porter, Cobern, 2001). This is understandable because EE was still developing as a subject and the existence of state standardized tests were still in the development stage. Also, much of the research that has been done has much to do with the goals of EE set out by the Tbilisi Declaration, The Intergovernmental Conference on Environmental Education of 1977 (United Nations Educational, Scientific and Cultural Organization / United Nations Environment Program [UNESCO/UNEP]). These goals include:

- To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas.
- To provide every person with opportunities to acquire knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.
- To create new patterns of behavior of individuals, groups and society as a whole towards the environment (UNESCO/UNEP, 1977).

More important, however, is that the proponents of EE are probably more interested in the reform of school curriculums along a cognitive and or constructivist

approach that involves the development of student self-awareness and social responsibility and less with a system that teaches primarily to the test.

Research in EE has also primarily looked at the five categories of EE objectives that were spelled out in the Tbilisi Declaration including awareness, knowledge, attitudes, skills, and participation (UNESCO/UNEP, 1977).

Volk & McBeth (1997) summarized the findings of 32 studies which were done between the time period of 1977 and 1995. He found that 28 studies looked at attitude and affective variables and came to inconclusive outcomes, with 43% of the treatment groups reporting positive change, 36% reporting no significant changes, and 21% reporting mixed results. Fourteen studies measured environmental-issue knowledge and 86% of these studies reported positive change after the introduction of EE into the curriculums. Nine studies looked at responsible environmental behavior after EE intervention and reported a 78% positive change. Seven studies looked at ecological knowledge variables and discovered an 86% positive change. Seven studies looked at additional determinants of responsible environmental behavior and found that 71% of the treatment groups responded positively, while 29% showed mixed results. Six studies looked at acquisition of socio-political knowledge and reported 100% positive outcome. Six more studies reported a 100% positive relation between cognitive skills and impacts of EE instruction.

The outcomes were very positive but Volk & McBeth (1997) critiques these studies as possibly giving an incomplete picture of EE in the U.S. because the sample sizes were generally too small, and demographically inadequate. Furthermore, the validity could have been called into question because the instrumentation may not have

been accurately measuring the intended variables. For instance, a ten question survey may not determine the environmental literacy of a child (Volk & McBeth, 1997). Also, many studies did not share existing instrumentation which created non-uniformity of results among the different studies (Volk & McBeth, 1997).

One certainty is that EE, at least at the K-12 level, is naturally an integrated curriculum, and for the most part is learned experientially through field trips and experimentation in real-world activities. EE is primarily rooted in a constructivist doctrine which states that "a learner's prior knowledge is the most important ingredient in the process of meaningful learning" (Lisowski & Disinges, 1991, p. 19).

In a study to determine the validity of this statement, Lisowski & Disenges (1991) did Student Ecology Assessments (SEA) on 5th grade students to determine if field based activities helped students retain information on ecological concepts more readily than when similar content was covered in a classroom setting. The study revealed a positive difference between students who received field based activities when compared to those that did not experience the activities (Lisowski & Disenges., 1991). Studies such as these could allay the fears of some educators that "mandated high-stakes testing is a major threat to curriculum integration" and a school's commitment to meeting the needs of its students (Pale et al., 2001, p. 7). However, as noted above, not many studies have specifically been done to investigate student performance on the new standardized tests based on whether their school has provided an integrated curriculum or not.

Building upon past research in EE, Lieberman & Hoody (1998) conducted a nationwide study that used *Environment as the Integrating Context for Learning*™ (*the EIC model*™) developed by the *State Education and Environment Roundtable* (SEER).

SEER is a cooperative endeavor amongst 15 state education departments seeking ways to improve K-12 achievement and teaching methods using the *EIC model*™: "Integrated-interdisciplinary instruction that breaks down traditional boundaries between disciplines; community based investigations as learning experiences that offer both minds-on and hands on experiences through service learning opportunities; collaborative instruction so teachers, parents, students, and community members can connect together instruction and learning; learner-centered constructivist approaches adapted to the needs and unique abilities of individual students; combinations of independent and cooperative learning; and, local natural and community surroundings as the "venue" for connecting together these proven pedagogies, to improve teaching and learning." (SEER, *the EIC Model™*, 2005, p. 1).

The focus of the Lieberman & Hoody (1998) Roundtable study was to determine "the effects on learning and instruction of using the environment as an integrating context in K-12 schools" (p. 2). The researchers then determined the best schools for the study; those which included the broad range of concepts that epitomized *the EIC Model*™, and came up with 40 schools nationwide; 15 elementary, 13 middle, and 12 high schools. The four objectives of the study were:

- "to describe their common features;
- to identify the "best practices" that characterize their pedagogies;
- to examine the factors that led to their success or challenged them; and,
- to compile data on the effects on students and achievement in reading, writing, math, science, and social studies, and on teachers and instruction." (Lieberman & Hoody, 1998, p. 2)

The results of the interviews and surveys showed marked improvement across the board in all areas with the exception of one decrease of 3.1 % in a mean standardized math score of one high school. However it should be noted that mathematics was not integrated into the EIC program at this particular school (Lieberman & Hoody, 1998).

"Evidence gathered from 40 EIC study schools indicates that students learn more effectively within an environment-based context than within a traditional educational framework." (Lieberman & Hoody, 1998, p. 23). There are a few reasons this study differs from those in the past. First, it is a broader study than most with 40 schools participating nationwide. Second, the range of objectives was broader as well, covering attitudes, participation, student learning, teacher instruction, and knowledge, skills and retention. Third, unlike many EE studies in the past, knowledge was measured by student achievement on core subject standards and not on environmental literacy tools alone, thus establishing the importance of an integrated curriculum. It could be argued that the qualitative aspect of the study could be biased, but the number sampled was large enough (655 interviews) to discredit this critique (Lieberman & Hoody, 1998)

Demographics and K-12 Education

The key demographic trends that will impact the U.S. education system in the near future are a population that is becoming more diverse, a rapidly aging population, a higher demand for post-secondary education, and a disproportionate number of children below the poverty level (Education Commission of the States, 2004). Over the next 20 years, California, Texas, and Florida will have three-fifths of the U.S. total minority population (ECS, 2004). The U.S. Census 2000 indicated that 16% of children under 18

lived in poverty with African-Americans and Hispanics making up about 60%, and Anglo-Americans making up 16% of those living in poverty (ECS, 2004). The largest growing minority segment is Hispanics who are expected to represent 25% of the population by 2025 (ECS, 2004).

In Houston, Texas, as of 2000, the total population under age 18 was represented by 52.7% Hispanic, 26.8% African -American, 16.2% White, and the remainder being 9.7% for Other (National Center for Education Statistics 2004) (sic). The Houston Independent School District (H.I.S.D.), as well as other districts in Texas, administers the Texas Assessment of Knowledge and Skills (TAKS) in the spring of every year to track student progress (TEA, 2005). The TAKS test is a standardized test based on the Texas Essential Knowledge and Skills (TEKS) standards which cover about 19 different subject areas (TEA, 2005). It was first mandated for the years 2002-2003 and replaced the Texas Assessment of Academic Skills (TAAS) as the required test for different grade levels (TEA, 2005). The TAKS test "measures the statewide curriculum in reading at Grades 3-9; in writing at Grades 4 and 7; in English Language Arts at Grades 10 and 11; in mathematics at Grades 3-11; in science at Grades 5,10, and 11; and social studies at Grades 8, 10, and 11. The Spanish TAKS is administered at Grades 3 through 6. Satisfactory performance on the TAKS at Grade 11 is a required prerequisite to a high school diploma." (TEA, 2005, p. 1).

What many educators find disturbing is that these tests continually indicate a racial and economic bias in their outcomes, which originally may have even been intentional (Meier, 2002; Ravitch, 2000; Whitiker, 2004). It should be noted, however, that Texas Hispanics and African-Americans performed as well or better than Anglo-

Americans in seven other states in 8th grade writing (Haycock & Jerald, 2002). However, the general state of education in the U.S. is that Hispanic and African-American students graduate from high school performing at an 8th grade level of education (Haycock & Jerald, 2002).

The achievement gap in school is still reflected in standardized tests on the whole, particularly between Anglo-Americans, African-Americans and Hispanics (Meier, 2002; Ravitch, 1995). The explanation for this gap in many studies typically indicated poverty, limited English proficiency (LEP) and familial influences as being primary variables associated with these outcomes, the racial intelligence theory being basically dismissed during the 1960's (Ravitch, 1995). However more recent studies would also include such variables such as mobility rates or transience of migrant families (Haycock & Jerald, 2002), motivational factors based upon cultural differences and sensitivity to cultural stereotypes (Meier, 2002), and patterns of teaching "down" to students who are minorities, economically disadvantaged, and have Limited English Proficiency (LEP) status (Haycock & Jerald, 2002). Mobility rate may play an important role particularly with Mexican immigrant families in states like Texas, with rates over 20% not being uncommon (HISD, 2005). "They change schools frequently, perform poorly, and often have language problems, but 800,000 migrant children in the U.S. deserve a chance for success." (Romanowski, 2002, p. 42).

The *No Child Left Behind Act* (NCLB) of 2002 was meant to be a tool to bridge the achievement gap demographically as well as academically speaking (107th Congress, Public law 107-110). Like the *Elementary and Secondary Education Act* (ESEA, 1965) it amended, most funding for education is drawn from states and localities (Ravitch, 1995).

However, more funding from the federal government is being earmarked for poorer districts and districts with a higher percentage of Hispanic, African-American, and Native American students (National Education Association [NEA], 2005).

Title I schools are those schools that receive funding from the government if 40% or more of the school is considered economically disadvantaged. This was dropped from the original level of 75% disadvantaged (NEA, 2005). Other priorities of the *No Child Left Behind* act in terms of the disadvantaged and minority students include:

- "Reading First**:** Supply over $1.1 billion to states to promote the use of scientifically based research to provide high-quality reading instruction for grades K-3.

- Improving Teacher Quality Grants**:** Provide states with $2.9 billion for teacher professional development and training.

- English Language Acquisition**:** Assists schools in improving the education of limited English-proficient (sic) children so that they can teach children to learn English and meet state academic standards.

- Other NCLB programs**:** Includes those to support charter schools; to support safe and drug-free schools; to improve math and science education; to support after-school learning programs; to assist American Indian, Alaska Native, and migrant students; and to support the use of education technology.

- Individuals with Disabilities Education Act (IDEA): IDEA assists states and local schools in educating children with disabilities. Part B, the second largest federal K-12 program, would provide over $11 billion to states and local schools to assist

their efforts" (United States Department of Education, 10 facts about NCLB Act, 2005, p. 1).

Motivational Studies and K-12 Education

A. Current Research in K-12 Education

A good deal of research has been done concerning elements of motivation in human beings. The major concern for motivational studies in K-12 has to do with the students' sustained motivation towards academic achievement (Chiu, 1997; Palardy, 1997; Williams & Stockdale, 2004). Research in this area has primarily fallen into two different camps; the behavioral and cognitive approaches (Williams & Stockdale, 2004). The essential difference in the meta-analysis of these approaches is that the behaviorists tend to look at extrinsic rewards as a primary motivator (Skinner, 2002; Covington 1999), while cognitive research would favor intrinsic motivational elements, since this type of motivation is self-determined (Ryan & Deci, 2000; Mawhinney, 1990). These two approaches tend to create extreme points of view, which when taken at face value would suggest that one would either offer external rewards only to continue sustained interest in a subject area (Cameron, 1994), or one would attempt to create an interesting environment that would promote self motivation, rejecting external rewards because they are artificial and would not promote sustained interest (Deci, Koestner, & Ryan, 1999). Like many things, the answer probably lies somewhere in between (Williams & Stockdale, 2004).

Williams & Stockdale (2004) offer a bridge between these two camps, first by stating what may be obvious: Intrinsic motivation is obviously the ideal, but may not

occur in unmotivated students unless there has been some history of external rewards. The trick is to know when to use extrinsic methods and what contingencies the rewards encompass (Williams & Stockdale, 2004). The Cialdini, Eisenburg, Green, Rhoads, & Bater (1998) study blended intrinsic-extrinsic motivational elements based upon timing and contingency. Findings of this study indicated that external rewards upon completion of a task (project, test, etc.) well done_ improved student performance in the future as they then showed signs of intrinsic motivation on future tasks of a similar nature. On the other hand, the contingency least likely to promote future performance was the act of simply rewarding a student to take part and complete a task. This in fact, can often have negative effects on future motivation and performance (Cialdini et al., 1998). Williams & Stockdale (2004), points out that this approach is only ideal if the educator knows that the student has a chance of succeeding in the task at hand; otherwise the effects of failure could be detrimental. Motivation to avoid failure may have equal weight when compared to motivation to achieve (Chiu, 1997).

Regardless of how motivation should be viewed (intrinsic/extrinsic), research would suggest that it is particularly important to first have goals in mind for the curriculum as well as for the students (Williams & Stockdale, 2004; Hootsein, 1998; Palardy, 1997). Teachers should have goals in mind for what they wish students to learn, while personal goal setting for students "is another way to help unmotivated students believe they are in control of their own learning" (Hootstein, 1998, p. 58).

Motivational researchers will often suggest lists of things to do to inspire motivation in students, and setting goals and objectives are often priorities (Williams & Stockdale, 2004; Hootstein, 1998; Palrady, 1997). Hootstein developed the RISE Model

(1998) suggesting a four step process to motivating a student: Relevant subject matter (R); Interesting instruction (I); Satisfied learner (S); and Expectations for success (E).

Relevant subject matter, in a sense, means bringing reality to the discussion. For instance, an instructor may first broach a discussion concerning flash flooding, allowing students to reveal potentially exciting stories that they may have experienced. This may create a higher interest in a potential discussion concerning the ecology of watersheds. Interesting instruction is possibly the linchpin in creating intrinsic motivation in a student (Hootstein, 1998). Often a question with an answer that is not immediately obvious or is seemingly contradictory, but is understood by the student, can lead to higher self-esteem and a motivation to learn more. For instance, questions such as "Why do some snakes lay eggs and some give live birth?" or "Why do levels of DDT increase in potency as they move up the food chain rather than down?"

When Hootstein (1998) refers to a satisfied learner, he is referring to the sense of satisfaction a student receives upon completion of a task well done. This, of course, needs to be recognized externally by an educator in the form of an award. However, the external reward needs to be specific to the nature of the task completed and inspiring for the student to keep up the good work. For instance, statements like "You have clearly understood the exponential growth of the DDT in the food chain" as opposed to "Good job on the paper" may be better because it acknowledges and informs the student rather than controls them. Satisfaction occurs internally but needs to be acknowledged externally (Hootstein, 1998). Finally, an expectation for success means "increased effort will likely lead to success" (Hootstein, 1998, p. 58). Feedback that acknowledges that the

work was difficult or required a lot of work is necessary to instill the expectation for success (Hootstein, 1998).

For the purpose of this study, in which attendance is the sole variable indicating a students motivation to learn, some studies would indicate (Brewster & Fager, 2000; Blank, 1997; Woods, 1995) that there is a high correlation between a rise in attendance rates, a lowering in dropout rates and a students motivation to learn and be involved in school. It should be noted that levels of motivation gradually decrease as students become older (Brewster & Fager, 2000). This can be attributed to many reasons, but for the most part students become more disengaged from school activities usually beginning in middle school and more significantly in high school (Lumsden, 1994).

B. Environmental Education and Motivational Studies

Research topics in EE often have dealt with the measuring of student behavior and attitude towards the environment (Hungerford, Blaum, Volk, & Ramsey 1990; Leeming et al., 1993; Marcinkowski, 1989; Volk et al., 1997). Essentially, many studies have more to do with the motivations of students towards the environment in terms of attitude and behavior than on knowledge or academic achievement. Out of the 32 studies on EE summarized by Volk et al. (1997), all of them included instrumentation that measured attitude and/or behavior, whereas 19 measured knowledge of environmental issues, and only eight measured ecological knowledge. Leeming et al. (1993) summarized 17 studies on EE interventions into core curriculum, all of which measured attitude and/or behavior, whereas only nine included knowledge as a dependent variable. The Lieberman & Hoody (1998), study included knowledge, attitude and behavior in all

treatment and controls schools, and also included attendance as another variable determining student motivation.

Hungerford et al. (1998) points out that many studies in EE operate under the premise that knowledge leads to awareness and attitudes, which in turn, leads to action (presumably positive). However, he critiques most research supporting this hypothesis because research has often only looked at one of these variables at a time, and these were often correlation studies that could not reveal "cause and effect" (Hungerford et al., 1998). Hungerford et al. (1998) points out that the Hines, Hungerford, & Tomera (1987) model for Responsible Environmental Behavior (REB) study may have a been a key study because of its attempt to modernize and expand upon the simplistic knowledge →awareness/attitude→action model. The Hines et al. (1987) REB model as a flow chart would be:

Entry Level Variables→Ownership Variables→Empowerment Variables→Behavior.

- Entry level variables would include sensitivity, attitudes toward pollution, technology and economics, knowledge of ecology, and androgyny; sensitivity being the major variable.
- Ownership variables would include in-depth knowledge about issues and personal investment in issues and the environment as the major variables, and knowledge of the consequences of behavior and personal commitment to issue resolution as the minor variable.
- Empowerment variables would include knowledge of and skill in using environmental action strategies, locus of control (reinforced for doing something),

intention to act as the major variables, and in-depth knowledge about issues being the minor variable (Hungerford et al., 1990)

Like the chicken and the egg parable, knowledge, awareness, and attitude are not necessarily a stepwise procedure. Although, it would seem that personal factors may weigh heavily upon one's willingness to learn and take action. Just as with motivational studies educating to change behavior towards the environment requires goals and objectives (Hungerford et al., 1990), the guiding principles developed by the Tiblisi conference (Simmons, 1991) states: "to foster clear awareness of, and concern about economic, social, political and ecological interdependence in urban and rural areas; to provide every person with opportunities to acquire the knowledge values and skills needed to protect and improve the environment; to create new patterns of behavior of individuals, groups and society as a whole towards the environment" (p. 1). Hungerford et al. (1990) present a super ordinate goal for EE: "to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between the quality of life and the quality of the environment" (p.13).

Setting goals is the road to an answer while the question is what model of REB should be used to achieve this goal. Researchers have continued to build off of the REB model trying to determine what variables should be included as precursors to REB. Marcinkowski (1998) reviewed three studies concerning precursor variables to REB and effectively synthesized their findings into 5 important variables: "(1) environmental sensitivity; (2) knowledge of citizenship action strategies; (3) skill in using citizenship

action strategies; (4) individual locus of control; and (5) group locus of control" (Hungerford et al., 1998, p. 273). Environmental sensitivity served as the second strongest predictor variable for two studies (Sia, 1985; Sivek, 1989), but was not as strong in Marcinkowski's first 1989 study (Marcinkowski, 1998). However, Marcinkowski (1998) later revisited this variable and found that it is beginning to factor in more because it is becoming more clearly defined. These definitions are, however, culturally biased and universal agreement on its meaning remain lacking. Knowledge of citizenship action strategies was overall the strongest predictor in Marcinkowski et al.'s (1989) study while skill in using citizenship strategies were the strongest in Sia's (1985) and Sivek's (1989) studies.

The high correlation between these variables would probably explain this disparity (Marcinkowski 1998). Individual and group loci of control were high predictors in all models (Marinkowski, 1998). The interesting trend in behavioral research in the field EE is the evolution of thinking in terms of the individual's changing behavior (Hines et al, 1987) and the changing behavior of the community at large (Marinkowski, 1998).

National Wildlife Federations® Schoolyard Habitat Program®

The curriculum used in this study was the *Schoolyard Habitats Program®* (*SYH Program®*). Created by the NWF® in 1996, the goals of the *SYH Program®* include helping interested schools and communities create and restore wildlife habitats on school grounds and creating a cross-curricular learning environment while teaching about wildlife habitat and conservation (NWF®, 2001).

The *SYH Program*® curriculum is divided into two activity levels: K-8 and 9-12. Applications are further subdivided into smaller segments of grade levels to align with national academic standards (NWF®, 2001). For the purpose of teachers and students in Texas, the curriculum also aligns with the TEKS.

The *SYH Program*® grew out of an already existing NWF® program called the *Backyard Wildlife Habitat*™ (BWH™) program which was started in 1973. This fostered the creation of backyard wildlife habitats by private land owners (NWF®, 2001). Like the BWH™, the *SYH Program*® had a certification process that the designers were awarded with upon completion of a habitat (NWF®, 2001). The requirement for a certified site is the completion of a habitat that has the four necessary elements of a habitat: food, water, cover, and a place to raise the young (NWF®, 2005). For the *SYH Program*®, the additional requirement is that the site is used as an educational teaching resource. Interested schools then complete an application and enclose a small fee to the NWF® and the certification process is complete (NWF®, 2005).

The ultimate purpose of the program is to connect the students, teachers, schools, community, wildlife, and the local environment (NWF®, 2001). Students learn through hands on activities which are intended to enhance student "comprehension and performance" (NWF®, 2001, p. 3). By creating working habitats, students are also expected to gain self-esteem and a sense of environmental stewardship (NWF®, 2001). Teachers have the opportunity to offer a potentially powerful learning tool not only to improve environmental and ecological literacy amongst the students, but also provide an integrated context for learning to improve students' knowledge of basic principles they will need to know for core subject areas (NWF®, 2001). Also, students with learning

difficulties in the classroom may find certain concepts easier to retain in an outdoor hands-on venue (NWF®, 2001). The obvious benefits for schools are to provide an on-site "field trip" of sorts which is far less expensive, and easy access to a learning tool that could potentially increase a school's academic performance, something administrators in this high-stakes testing environment do not take lightly (NWF®, 2001).

The community can be enriched because, ideally, parents should take part in the creation of the habitat, along with college students, and professional landscape designers, planners, civic organizations, and others (NWF®, 2001). Wildlife is benefited by being provided a habitat, which may be a concern in rapidly expanding urban areas (NWF®, 2001). The ways the local environment can be benefited are numerous. Reintroduction of native species is valuable for the health of the soil, watershed areas, and larger ecosystems. Strategic placement of habitats on school grounds can reduce energy consumption and reduce landscaping costs associated with turf and exotic plant upkeep. Also, runoff is reduced if the habitat is used to replace asphalt and non-native turf (NWF®, 20001).

As noted before, the *SYH Program*® can be an effective means for teaching about ecology and the local environment, but this is only one prong of its two-pronged approach. The second prong is to provide a means to meet the academic standards that students need to meet in each state (NWF®, 2001). NWF® provides a *How-to Guide for K-12 School Communities* (2001) and two day workshops for teachers that describe the program, but also provide lesson plans that show how teachers can integrate state and national standards into the program (NWF®, 2001). The seven national standards the SYH Program® uses as guidelines are:

- *Benchmarks for Science Literacy*, Project 2061(American Association for the Advancement of Science (AAAS), 1993) (NWF®, 2001).
- National Science Education Standards (National Research Council (NRC), 1996).
- *Curriculum and Evaluation Standards for School Mathematics* (National Council of Teachers of Mathematics, 1989) (NWF®, 2001).
- *Standards for the English Language Arts* (National Council of Teachers of English and the International Reading Association, 1996) (NWF®, 2001).
- *Curriculum Standards for Social Studies: Expectations of Excellence* (*National* Council for the Social Studies, Bulletin 89, 1994) (NWF®, 2001).
- *Geography for Life: National Geographic Standards* (Geography Education Standards Project, National Geographic Research & Exploration, 1994) (NWF®, 2001).
- *National Educational Technology Standards for Students* (International Technology Standards for Technology in Education, 2000) (NWF®, 2001)

An example of how standards would be integrated for Math Standard 9: Geometry and Spatial Sense K-4 *Curriculum and Evaluation Standards for School Mathematics* (National Council of Teachers of Mathematics, 1989), for instance, would be “Look for patterns in nature such as tree shapes, leaf shapes and color of leaves” (NWF®, 2001, p.61). For Algebra Standards for Grades 9-12 *Curriculum and Evaluation Standards for School Mathematics* (National Council of Teachers of Mathematics, 1989) students would “Track the growth or decline of a certain species found in your Schoolyard Habitats project area. After compiling the data, calculate the rate of change. Hypothesize about the reasons for any changes” (NWF®, 2001, p. 62).

Activities would not be narrow in focus and would involve skills from different subject areas. For instance, the activity Habitat Hunt (NWF®, 2001, p. 85-93) would focus on science and geography subjects, while the Community Survey activity (NWF®, 2001, pp. 135-139) would require the creation of surveys for research on attitudes and would focus on language arts, science, geography, and statistics subjects.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine if the SYH Program® had an effect on the motivation and academic achievement of primary school students in Houston, TX. This chapter explains the instrumentation used, and describes the population that participated in the study. Data collection and methodology are reviewed as well.

Instrumentation

The instruments for this study included academic records, attendance records and demographic records of the student sample. These were provided by the Houston Independent School District (H.I.S.D., 2004) research department.

Texas Assessment of Knowledge and Skills (TAKS) Tests

The TAKS test scores assess the student achievement on the Texas Essential Knowledge and Skills (TEKS), which are the state's curriculum goals (TEA, 2003). For the purposes of this study, the TAKS test scores served as the testing instrument to assess students' knowledge of core curriculum. The TAKS test scores were supplied by the (H.I.S.D., 2004) research department.

Primary and secondary students in Texas and the H.I.S.D. are required to take TAKS examinations during the spring of each year in order to advance to the next grade. This study looked specifically at the scores of 3rd and 4th graders. Third graders in Texas are required to take a Math TAKS and a Reading TAKS, whereas 4th graders must also take a Writing TAKS as well as the other two exams (H.I.S.D., 2004). For the purposes of this study, only the raw Mathematic and Reading scores were used to determine academic achievement in order to fit the pretest-posttest parameters of the study. Raw scores were provided and range from 0 to 40 (H.I.S.D, 2004).

Attendance Records

Attendance records were supplied by the H.I.S.D. research division (2004). For the purposes of this study, only data that concerned actual days attended and days of absence were considered.

Demographic Records

Demographic records were supplied by the H.I.S.D research division (2004). The demographic variables that were used in this study include economic status, ethnicity, and gender. Economic status was measured in terms of which students received free lunches, reduced price lunches, or were noted as having other economic disadvantages versus students were deemed not economically disadvantaged enough to receive the free or reduced lunch program. Ethnicity included White, African American, Hispanic, Asian, and Native American.

Population

The sample population that was used for this study was drawn from 3rd and 4th grade students in the Houston Independent School District in Texas. The total sample population was 492 students. The treatment group consisted of 306 students. The control group consisted of 186 students. The treatment group consisted of schools that had working certified Schoolyard Habitat® sites. Treatment classrooms also had teachers who integrated the SYH® into their core curriculum. Control classrooms had teachers who did not integrate the SYH Program® into their core curriculum. Treatment and control groups were matched based upon demographic variables (gender, ethnicity and economic status). All data for study was provided by the H.I.S.D. (2004) research department.

Control Group

Allen Elementary School: Total enrollment of the 2002-2003 3rd grade and 2003-2004 4th grade classes was 30. The ethnic breakdown of these classes was as follows: 36.7% African American and 63.3% Hispanic. A total of 90% of students was eligible for free or reduced price meals.

Will Rogers Elementary School: Total enrollment of the 2002-2003 3rd grade class was 89 and total enrollment for the 2003-2004 4th grade class was 90. The ethnic breakdown of these classes was as follows: 11.2% White, 36% African American, 47.2% Hispanic, and 5.6 % Asian. A total of 58.4% of the students were eligible for free or reduced price meals.

Horn Elementary School: Total enrollment of the 2002-2003 3rd and 2003-2004 4th grade classes was 67. The ethnic breakdown of these classes was as follows: 67.2% White, 10.4% African American, 7.5% Hispanic, and 14.9% Asian. A total of 11.9% of the students were eligible for free or reduced price meals.

Treatment Group

Elrod School, H.I.S.D.: Total enrollment of the 2002-2003 3rd grade class was 66 and total enrollment of the 2003-2004 4th grade class was 66. The ethnic breakdown of these classes was as follows: 1.5% White, 40.9% African American, 56.1% Hispanic, and 1.5% Asian. A total of 98.5% of the students were eligible for free or reduced price meals

Rice School, H.I.S.D.: Total enrollment of the 2002-2003 3rd class and the 2003 -2004 4th grade class was 100 students each year. The ethnic breakdown of these classes was as follows: 7.0% White, 36.0% African American, 52.0% Hispanic, and 5.0% Asian. A total of 56.0% of the students were eligible for free or reduced price meals.

West University Elementary School, H.I.S.D.: Total enrollment of the 2002-2003 3rd class and 2003-2004 4th grade class was 140 students each year. The ethnic breakdown of these classes was as follows: 82.1% White, 3.6% African American, 7.9% Hispanic, and 6.4% Asian. A total of 6.4% of the students were eligible for free or reduced price meals.

These schools were matched in their respective order based upon their demographic features (ie. Elrod/Allen, Rice/Will Rogers, West University/Horn). Control groups were given a value of 0, and treatment groups were given a value of 1

when using *Statistical Package for the Social Sciences*® (SPSS®). Table 1 represents the matched schools ethnic and economic status.

Table 1

Ethnic and economic status profile of matched control and treatment samples and whole sample in study of the effects of SYH Program® on the academic achievement and motivation to learn of 3rd and 4th graders in the H.I.S.D.

School	N	%White	%African-American	%Hispanic	%Asian	%Economically Disadvantaged
Control Allen	30	0	36.7	63.3	0	90
Treatment Elrod	66	1.5	40.9	56.1	1.5	98.5
Control Will Rogers	89	11.2	36	47.2	5.6	58.4
Treatment Rice	100	77	36	52	5	56
Control Horn	67	67.2	10.4	7.5	14.9	11.9
Treatment W. University	140	82.1	3.6	7.9	6.4	6.4
Whole Sample	492	36.2	24	33.7	6.1	44.1

Curriculum

The curriculum and treatment used in this study was the Schoolyard Habitats Program® (SYH Program®). Created by the NWF® in 1996, the intention of the SYH Program® is to help interested schools and communities create and restore wildlife habitats on school grounds. The goal of the SYH Program® was to create a cross-curricular learning environment while teaching about wildlife habitat and conservation (NWF® Schoolyard Habitats®, 2001, p. 2).

The SYH Program® curriculum is divided into two activity levels: K-8 and 9-12. Applications were further subdivided into smaller segments of grade levels to align with national academic standards (NWF®, 2001, pp. 58-67). For the purpose of helping teachers and students in Texas, the curriculum also aligns with the TEKS.

Data Collection and Analysis

The research design used in this study was a nonrandomized control group – treatment group pretest-posttest design. Data on sample student academic scores (TAKS), attendance records, and demographic records from the beginning of the fall 2002 semester to the end of the spring 2004 semester were collected and reviewed. Students, who did not use SYH Program® as an integrated curriculum, were included in this research as control groups whereas students who used the SYH Program® as an integrated curriculum were considered the treatment group. The same students' data was collected from the 3rd to 4th grade, or fall 2002 to spring 2004. All records were provided by the H.I.S.D. research division (2004) in the form of a Statistical Package for the Social Sciences ™ (SPSS™) 12.0 for Windows data file.

Data Analysis for the First Objective

TAKS test scores for the 3rd grade were considered the pretest portion of the study whereas 4th grade test scores of the same students were considered the posttest portion of the study. For the purposes of this study, only the raw Math and Reading TAKS scores were considered.

Data Analysis for the Second Objective

Attendance rates and absence rates for the 3rd grade were considered the pretest portion of the study whereas 4th grade attendance rates and absence rates of the same students were considered the posttest portion.

Data Analysis for the Third Objective

The variables of gender, ethnicity, and economic status were also recorded during the pretest and posttest portions of the study for each student.

CHAPTER IV

RESULTS

The purpose of this study was to determine if the SYH Program® had an effect on the motivation and academic achievement of primary school students in Houston, Texas. The objectives of this study were to: 1) determine if the SYH Program® was associated with the academic achievement of students based upon their TAKS scores, 2) determine if the SYH Program® was associated with the student samples motivation to learn, based upon their attendance records, 3) determine if there was a difference in academic achievement of those students that participated in the SYH Program® based upon the demographic variables of gender, ethnicity, and economic status. All data was formatted through the use of Statistical Package for the Social Sciences™ (SPSS™) 12.0 for Windows data file.

Findings Related to Objective I

The first objective of the study was to determine if the SYH Program® was associated with the academic achievement of students based upon their TAKS scores. TAKS test scores for the 3rd grade were considered the pretest portion of the study, whereas 4th grade test scores of the same students were considered the posttest portion of the study. For the purposes of this study only the raw Math and Reading TAKS scores

were considered. Raw TAKS scores are measured a scale of 0 to 40. The raw score is the number of items answered correctly on a subject area test.

Tables 2 through 5 shows the mean TAKS scores for matched control and treatment student samples in math and reading from the 3rd and 4th grade. The mean scores and standard deviations were calculated using the SPSS™ "frequencies" function.

Table 2

TAKS 3rd grade raw mean math scores for matched control and treatment samples in the study of the effect of the SYH Program® on the academic achievement in elementary school students in the H.I.S.D.

	School	N	Mean Score	Standard Deviation
Control	Allen	30	28.67	6.94
Treatment	Elrod	65	27.06	6.74
Control	Will Rogers	88	28.67	5.90
Treatment	Rice	93	31.32	5.50
Control	Horn	66	34.70	4.03
Treatment	W. University	133	35.49	4.33

Mean scores and standard deviations for paired schools were similar for the matched control/treatment 3rd grade math score samples. The highest mean score belonged to W. University while the lowest belonged to Elrod, both of which were treatment schools.

Table 3

TAKS 4th grade raw mean math scores for matched control and treatment samples in the study of the effect of the SYH Program® on the academic achievement in elementary school students in the H.I.S.D.

	School	N	Mean Score	Standard Deviation
Control	Allen	30	29.07	8.21
Treatment	Elrod	63	28.92	7.81
Control	Will Rogers	83	34.30	5.03
Treatment	Rice	93	35.12	6.13
Control	Horn	65	34.42	4.29
Treatment	W. University	137	37.77	6.14

The mean scores differed less for all the matched schools with the exception of Horn (control) and W. University (treatment), and there was a greater deviation from the mean for all but Horn (control). The most notable difference from both mean score and standard deviation from the mean were between W. University (treatment) and Horn (control). Again, the highest and lowest mean scores belonged to W. University and Elrod, respectively.

Table 4

TAKS 3rd grade raw reading scores for matched control and treatment samples in the study of the effect of the SYH Program® on the academic achievement in elementary school students in the H.I.S.D.

	School	N	Mean Score	Standard Deviation
Control	Allen	30	26.70	6.02
Treatment	Elrod	62	25.32	6.57
Control	Will Rogers	83	28.88	6.10
Treatment	Rice	92	29.59	5.03
Control	Horn	65	30.41	5.74
Treatment	W. University	137	33.19	3.32

Reading mean scores and standard deviation for 3rd grade reading tests were also similar when control and treatment groups were compared, although not as noticeably as with the 3rd grade math scores. The means were generally lower throughout the three matched school samples. Again, the highest and lowest mean scores belonged to W. University and Elrod, respectively.

Table 5

TAKS 4th grade raw reading scores for matched control and treatment samples in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

	School	N	Mean Score	Standard Deviation
Control	Allen	30	28.30	6.94
Treatment	Elrod	61	27.10	7.27
Control	Will Rogers	83	32.01	5.94
Treatment	Rice	93	33.22	5.31
Control	Horn	65	33.30	6.09
Treatment	W. University	131	36.39	3.88

The mean reading scores and standard deviations closely parallel each other for the 4th grade samples as well, with the exception of W. University and Horn which show a wider disparity in both, as they did for the math mean scores. Again, the highest and lowest mean reading scores belonged to W. University and Elrod, respectively.

Tables 6 and 7 describe the change in the TAKS math and reading scores between the 3rd and 4th grade for matched treatment and control samples and for all students. The change in scores was calculated by computing a new variable based upon the difference between the raw score results of the spring of 2003 and the raw scores of the spring of 2004 using the SPSS™ "compute" function. The results were then displayed using the SPSS™ "frequencies" function.

Table 6

Change in TAKS math scores from 3rd to 4th grade for matched treatment and control samples and sample as a whole in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

	School	N	Change Mean	Standard Deviation
Control	Allen	30	-1.34	6.13
Treatment	Elrod	63	0.46	5.77
Control	Will Rogers	83	3.40	5.94
Treatment	Rice	93	3.79	3.41
Control	Horn	65	-0.39	4.73
Treatment	W. University	131	2.27	3.27
Whole Sample		462	2.23	4.61

There was a general increase in math scores from 3rd to 4th grade which seemed mostly attributable to the parallel rise in scores of Rice and Will Rogers who both gained over three points. The widest difference in score change was between W. University and Horn where Horn had a slight drop in improvement. The smallest change was between

Elrod and Allen, although Allen itself dropped over one point which was the largest decrease in the sample population.

Table 7

Change in TAKS reading scores from 3rd to 4th grade for matched treatment and control samples and sample as a whole in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

	School	N	Change Mean	Standard Deviation
Control	Allen	30	-1.60	5.55
Treatment	Elrod	60	-1.55	6.86
Control	Will Rogers	83	-3.01	6.16
Treatment	Rice	92	-3.58	5.31
Control	Horn	65	-1.87	4.36
Treatment	W. University	127	-3.14	2.96
Whole Sample		444	-2.73	5.09

There was a general decrease in reading scores from 3rd to 4th grade for the entire sample population. Will Rogers and Rice, as a matched pair, seemed to influence this change the most; However, W. University also decreased over three points. Once again, W. University and Horn showed the greatest difference in score change.

Results of change in 3rd to 4th grade TAKS math scores in student samples indicates, overall, that the treatment schools showed increased performance as represented by rising mean scores.

Results of change in 3rd to 4th grade TAKS reading scores in student samples would indicate, overall, that both treatment and control schools showed decreased performance, as represented by decreasing mean scores. The control schools did not decrease as much as the treatment schools, with the exception of Allen (Control) and Elrod (Treatment) which lowered at very similar levels.

Table 8 includes the results of a Spearman's rho bivariate correlation between math TAKS scores changes from 3rd to 4th grade and control and treatment schools. A Spearman's rho correlation was used because the distributions of scores discussed previously were determined not to be normal. Only the results of the paired samples W. University and Horn and the treatment and control samples as a whole are displayed in Table 8 since they were the only significant correlations. The SPSS™ "bivariate correlation" function was used. Control schools were given a value of 0 while treatment schools were given a value of 1. Negative correlations can be attributed to the control schools while positive correlations could be attributed to treatment schools.

Table 8

Spearman's rho bivariate correlation between matched control and treatment schools and change in TAKS math score from 3rd to 4th grade in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

Schools	N	Correlation Coefficient	Sig.
Horn (Control)/ W. University (Treatment)	194	.297**	.001
Whole Sample (Control/Treatment)	462	.121**	.009

** Correlation is significant at a .01 level

The results of Table 8 showed that the change in TAKS math scores from 3rd to 4th grade between treatment and control samples were positively correlated at a level of .009. The positive correlation showed that there was a higher positive change in math scores for schools with the SYH Program®

The results of Table 8 showed that the change in TAKS math scores from 3rd to 4th grade between Horn (control) and West University (treatment) samples was positively correlated at a level of .001. This correlation support the findings for the whole sample.

Table 9 includes the results of a Spearman's rho bivariate correlation between reading TAKS scores changes from 3rd to 4th grade and control and treatment schools. A Spearman's rho correlation was used because the distributions of scores discussed previously were determined not to be normal. Only the results of the paired samples W.

University and Horn and the treatment and control samples as a whole are displayed in Table 9 since they were the only significant correlations. The SPSS™ "bivariate correlation" function was used. Control schools were given a value of 0 while treatment schools were given a value of 1. Negative correlations can be attributed to the control schools while positive correlations could be attributed to treatment schools.

Table 9

Spearman's rho bivariate correlation between matched treatment and control schools and change in TAKS reading scores from 3rd to 4th grade in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

Schools	N	Correlation Coefficient	Sig.
Horn (Control)/ W. University (Treatment)	182	-.147*	.047

* Correlation is significant at a 0.05 level

The total change from 3rd to 4th grade in TAKS reading scores for all student samples was not significant but the TAKS reading score changes from 3rd to 4th grade between Horn (control) and W. University (treatment) were negatively correlated at a level of .047. The negative correlation showed that there was a higher positive change in reading scores for Horn (control) student samples.

Discussion of Objective I Results

As indicated by Table 8, there was a positive relationship between schools that used the *SYH Program*® and improved TAKS math scores. These results would support the findings of the *State Education and Environment Roundtable* (SEER) study (Lieberman & Hoody, 1998) in which 73% of the students' samples improved in understanding of mathematical concepts when EIC was used in their curriculum. The results also support the findings of the Klemmer et al. (2005) study on the effects of using the *Junior Master Gardner* ™ (JMG™) program as an integrated curriculum and elementary students' math and science academic achievement. The results of this study showed that students who used the JMG™ showed significant improvement in math and science academic achievement.

On a whole, there was no relationship between schools that used the *SYH program*® and improved TAKS reading scores; However, Horn (control), as shown in Table 9, did show a significantly higher positive change in reading scores and this school did not have the *SYH Program*® integrated into its curriculum.

Although the *SYH Program*® is designed to be aligned to the Texas Essential Knowledge and Skills (TEKS) for at least seven subject areas, math and reading included, math would most likely be an easier subject matter to integrate into *SYH Program*®. The basic principles behind the creation and upkeep are mathematical in nature and it would logically follow that *SYH Program*® may help in the understanding of mathematical principles. For instance, the measuring of plots and the numbering of species within each plot in order to estimate the number in the larger area, which is specified activity in the *Schoolyard Habitats*: *A How-to Guide for K-12 School*

Communities (NWF®, 2004), presents obvious mathematical merit. Furthermore, the creation of the wildlife habitats is mathematical in nature because a general knowledge of geometry and measuring of spaces would be required.

Reading skills are also integrated into the *SYH Program*®. An example would be conducting reading activities outdoors within the habitat areas or having students' present reports on the habitat sites (NWF®, *2004*). The degree of separation for integrating reading skills as apposed to math skills appears to be at least one degree more, as reading needs to be imposed rather than being integral to the creation of the site, as math would be. Horn (control), as shown in Table 9, did show some significant improvement as opposed to its matched treatment school W. University. In actuality, it did not improve but merely showed significantly less of a decline in reading scores when compared to W. University. Most English language skills would most likely be exhibited in writing skills however, which was not in the scope of this study. These writing skills would include writing reports, school newspaper articles, presentations, posters, guidebooks, etc. (NWF®, 2004).

Findings Related to Objective II

The second objective of the study was to determine if the *SYH Program*® was associated with the student sample's motivation to learn, based upon the attendance records of student samples. Attendance rates for the 3rd grade were considered the pretest portion of the study whereas 4th grade attendance rates of the same students were considered the posttest portion.

Table 10 and 11 describes the attendance rates for 3rd and 4th grades of student samples, respectively. The attendance rates were calculated using the SPSS™ "frequencies" function.

Table 10

Attendance rates for matched treatment and control samples for the 3rd grade student sample in the study of the effect of the SYH Program® on the motivation to learn in elementary school students in the H.I.S.D.

	School	N	Mean Days Attended	Standard Deviation
Control	Allen	30	163.47	27.97
Treatment	Elrod	66	165.06	19.39
Control	Will Rogers	88	171.18	4.86
Treatment	Rice	93	171.14	4.02
Control	Horn	67	163.47	28.13
Treatment	W. University	140	168.76	11.99

There were 174 total days of enrollment within the school year, and as would be expected with attendance, the distribution of rates revealed a highly skewed pattern

Once again, the paired samples of Rice (treatment) and Will Rogers (control) showed closely related patterns in mean and standard deviation. Also, once again, W. University (treatment) and Horn (control) showed the widest differences in mean and standard distribution. Will Rogers (control) had the highest mean attendance rate while Horn (control) had the lowest attendance mean attendance rate.

Table 11

Attendance rates for matched treatment and control samples for the 4th grade student sample in the study of the effect of the SYH Program® on the motivation to learn in elementary school students in the H.I.S.D.

	School	N	Mean Days Attended	Standard Deviation
Control	Allen	30	170.77	4.21
Treatment	Elrod	66	169.09	12.23
Control	Will Rogers	89	169.72	11.16
Treatment	Rice	100	171.50	3.00
Control	Horn	67	169.45	7.24
Treatment	W. University	140	169.64	4.87

The attendance rates for the 4th grade student samples showed much more parallel patterns between the matched treatment and control schools. The distribution in rates, revealed by the standard deviation narrowed with the exception of Will Rogers, which widened. The most notable of the matched pairs was Horn (control) and W. University (treatment) which revealed very similar mean attendance rates. This was the opposite of what was true in the 3rd grade. The highest level of attendance was attributed to Rice (treatment) and the lowest level of attendance was attributed to Elrod (treatment).

Table 12 shows the change in attendance from 3rd to 4th grade for matched control and treatment samples as well as entire student sample. The change in attendance rates was calculated by computing a new variable based upon the difference between the attendance rates of the 2002-2003 school year and the 2003-2004 school year using the SPSS™ "compute" function. The results were then displayed using the SPSS™ "frequencies" function.

Table 12

Change in TAKS attendance from 3rd to 4th grade for paired treatment and control samples and whole sample in the study of the effect of the SYH Program® on the motivation to learn in elementary school students in the H.I.S.D.

	School	N	Change Mean	Standard Deviation
Control	Allen	30	7.30	28.59
Treatment	Elrod	66	4.03	17.64
Control	Will Rogers	89	-1.46	8.00
Treatment	Rice	100	0.36	2.68
Control	Horn	67	6.89	29.17
Treatment	W. University	140	0.88	11.64
Whole Sample		492	1.98	16.24

Change in attendance rates from 3rd to 4th grade seemed to fluctuate greatly between schools, although the overall pattern, with the exception of Will Rogers, was an increased number of days attended by all student samples. The most notable increase was with Allen.

Spearman rho bivariate correlations were run on the change from 3rd to 4th attendance rates between matched treatment and control groups and entire student sample. The two significant correlations that could be drawn were found between the change in attendance rates from 3rd to 4th grade and the Will Rogers (control)/ Rice (treatment) matched pair, and Horn (control)/West University (treatment) matched pair. The SPSS™ "bivariate correlation" function was used. Control schools were given a value of 0 while treatment schools were given a value of 1. Negative correlations can be attributed to the control schools while positive correlations could be attributed to treatment schools. Table 13 shows results of these correlations.

Table 13

Spearman's rho bivariate correlation between matched treatment and control schools and change attendance rates from 3rd to 4th grade in the study of the effect of the SYH Program® on the motivation to learn in elementary school students in the H.I.S.D.

Schools	N	Correlation Coefficient	Sig.
Horn (Control)/ W. University (Treatment)	207	-.139*	.046
Will Rogers (Control)/ Rice (Treatment)	189	.148*	.042

* Correlation is significant at the .05 level

There was a negative correlation between the change in attendance from 3rd to 4th grade and the matched schools Horn (control) and W. University (treatment) at a level of .046. This would show Horn (control), which did not use the SYH Program®, had a higher improved attendance rates versus the treatment school, W. University.

The results of Table 13 also showed that there was a positive correlation between Will Rogers (control) and Rice (treatment) groups and the change in attendance rates from 3rd to 4th grade at a level of .042. This positive correlation indicates that there was a relationship between the treatment school Rice, which used the SYH Program®, and improved attendance rates from 3rd to 4th grade.

Discussion of Objective II Findings

It became apparent during the initial descriptive analysis of student sample attendance, which were highly skewed, that attendance rates would be difficult to interpret. In the final analysis, using a Spearman's rho bivariate correlation to see a correlation between school sample attendance rates from 3rd to 4th grade and treatment and control groups, the findings were mixed. There was a weak significant positive correlation for Will Rogers (control) and Rice (treatment)and a weak negative correlation for Horn (control) and West University (treatment).

It is one of the intentions of the *SYH Program*® to motivate the student to learn and become more involved in school. As noted in the literature, it would fulfill all the criteria to instill intrinsic motivation by creating an engaging learning environment (Deci et al., 1999), providing relevant and interesting subject matter (Williams et al., 2004;

Hootstein, 1998; Palardy, 1997), and ultimately becoming a satisfied learner with a high self esteem (Hootstein, 1998).

It became evident, in the course of this research, that student attendance was a poor variable, on its own, to measure a student's motivation to learn. This is revealed by the mixed results and relatively weak correlations. Attendance rates were generally high amongst all of the school samples, and this probably has a lot to do with the age level of the participants. Based upon the literature, poor attendance rates become more evident in older children, usually starting in middle school and becoming progressively worse in high school (Brewster & Fager, 2000). The samples for this study were 3rd and 4th graders and factors such as family pressure, and stronger teacher-student relationships are stronger at this age than in older students (Brewster & Fager, 2000). Also, younger students typically have more of an inclination to learn and can deal with failure, after a strong effort, better than older students (Lumsden, 1994).

Findings Related to Objective III

The third objective of the study was to determine if there was a difference in academic achievement of those students that participated in the SYH Program® based upon the demographic variables of gender, ethnicity, and economic status.

Table 14 gives a general demographic profile of the school samples concerning gender. The SPSS™ "frequencies" mode was used to determine gender profile.

Table 14

Gender profile of matched control and treatment samples and whole sample in the study of the effect of the SYH Program® on the academic achievement in elementary school students in the H.I.S.D.

	School	N	%Male	% Female
Control	Allen	30	66.7	33.3
Treatment	Elrod	66	53	47
Control	Will Rogers	89	39.3	60.7
Treatment	Rice	100	52	48
Control	W. University	67	53.7	46.3
Treatment	Horn	140	50.7	49.3
Whole Sample		492	50.6	49.4

The ratio of male to female students for the total student sample was approximately equal. At the individual school levels, the distribution between genders became more uneven with the two control schools, Allen and Will Rogers; where Will Rogers (control) was weighted more towards the female gender. Allen (control), on the other hand, was weighted more towards the male gender. With the exception of Will

Rogers (control) all schools tended to have more males, as opposed to females within the sample.

A Spearman's rho bivariate correlation between genders and change in math and reading mean TAKS scores from 3rd to 4th grade for the entire student sample was done using the SPSS "bivariate correlation" function. However, the results were not statistically significant. Math and reading scores had little variability in both the 3rd and 4th grade when gender was analyzed.

Table 15 gives a general ethnicity profile of the school samples. The SPSS™ "frequencies" mode was used to determine gender profile.

Table 15

Ethnicity profile of matched treatment and control samples and whole sample in the study of the effect of the SYH Program® on the academic achievement in elementary school students in the H.I.S.D.

School	N	%White	%African-American	%Hispanic	%Asian
Control Allen	30	0	36.7	63.3	0
Treatment Elrod	66	7	40.9	56.1	1.5
Control Will Rogers	89	11.2	36	47.2	5.6
Treatment Rice	100	7	36	52	5
Control Horn	67	67.2	10.4	7.5	14.9
Treatment W. University	140	82.1	3.6	7.9	6.4
Whole Sample	492	36.2	24	33.7	6.1

Allen (control) and Elrod (treatment) student samples consisted primarily of African-American and Hispanic students. Will Rogers (control) and Rice (treatment)

student samples had a more of a mixed ethnic makeup, however African-American and Hispanic populations still represented the majority. Horn (control) and W. University (treatment) consisted of primarily white students, and a higher percentage of Asian students. The Asian students at Horn (control) actually outnumbered both African-American population and Hispanic student groups.

Table 16 displays Spearman's rho correlations for non-whites versus whites versus changes in TAKS math scores from the 3rd to 4th grade. The SPSS™ "bivariate correlation" function was used to display results. Non-white students were given a value of 0, while white students were given a value of 1. Negative correlations can be attributed to the non-white students, while positive correlations could be attributed to white students. No statistically significant association was found between non-Hispanics versus Hispanics, and non-Asians versus Asians student samples and change in TAKS scores from 3rd to 4th grade. Therefore results were not shown.

Table 16

Spearman's rho bivariate correlation between non-white versus white samples and change in TAKS math scores from 3rd to 4th grade in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

Schools	N	Correlation Coefficient	Sig.
Non-White/White	462	-.121**	.009

** Correlation is significant at a .01 level

The results of Table 16 shows that there was a negative correlation between the TAKS math score change and white vs. non-white ethnicities at a statistical significance of .009 level. The negative correlation indicates an association between non-white ethnicities and an improvement in TAKS math scores from 3rd to 4th grade.

Table 17 displays Spearman's rho correlations for non-African-Americans versus African-Americans versus changes in TAKS scores from the 3rd to 4th grade. The SPSS™ "bivariate correlation" function was used to display results. Non-African-Americans were given a value of 0 while African-Americans were given a value of 1. Negative correlations can be attributed to the non-African-American students while positive correlations could be attributed to the African-American students.

Table 17

Spearman's rho bivariate correlation between non-African-American versus African-American samples and change in TAKS reading scores from 3rd to 4th grade in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

Schools	N	Correlation Coefficient	Sig.
Non African-American/ African-American	462	.220**	.001

** Correlation is significant at a 0.01 level

The results of Table 17 shows that there was a positive correlation between the TAKS reading score change and non-African-American vs. African-American ethnicity at a statistically significant .001 level. The positive correlation shows an association between African-American ethnicities and an improvement in TAKS reading scores from 3rd to 4th grade.

Table 18 profiles the economic status of the student samples as a whole and by matched treatment and control student samples. For the purposes of this study, economic status was determined by whether the students were not identified as being economically disadvantaged and those that were economically disadvantaged. Economically disadvantaged students were determined by whether they were eligible for free meals, received reduced price meals, or had other economic disadvantages.

Table 18

Economic status profile of matched treatment and control samples and whole sample in the study of the effect of the SYH Program® study on the academic achievement in elementary school students in the H.I.S.D.

	School	N	%Not Economically Disadvantaged	% Economically Disadvantaged
Control	Allen	30	10.0	90.0
Treatment	Elrod	66	1.5	98.5
Control	Will Rogers	89	41.6	58.4
Treatment	Rice	100	44.0	56
Control	Horn	67	88.1	11.9
Treatment	W. University	140	93.6	6.4
Whole Sample		492	55.9	44.1

Allen (control) and Elrod (treatment) student samples consisted primarily of economically disadvantaged students. Will Rogers (control) and Rice (treatment) consisted of a fairly even distribution of students who were not economically

disadvantaged and those that were. Horn (control) and W. University (treatment) consisted of students who were primarily not economically disadvantaged.

A Spearman's rho correlation was done between the change in TAKS math and reading scores from 3rd to 4th grade and economic status. The results were not included here because no significant results were drawn.

Discussion of Objective III Results.

Of the three demographic variables analyzed in this study only ethnicity has any association with academic achievement and TAKS scores. In the final analysis, as seen in Table 16, using a Spearman's rho bivariate correlation analysis, it would appear that non-whites showed the most improvement in TAKS math raw scores. African-Americans showed a significant relationship with TAKS reading raw scores improvement at a statistically significant level of .001.

Tying the objective III results to the objective I results, one can see that the improvement in math scores were related to those schools that had a higher percentage of minority ethnicities (ie. non-white); most notably Will Rogers (control) and Rice (treatment) who showed the greatest improvement, as seen in Table 6. Also, as shown in Table 6, the treatment schools Elrod and Rice, both schools being primarily made up of minorities, outperformed their matched control schools Allen and Horn in math improvement from 3rd to 4th grade.

Although, all schools declined in TAKS reading raw scores from 3rd to 4th grade, the African-American student samples showed an improvement in reading scores. These findings support Haycock's (2002) research on achievement scores which revealed

that African-Americans in Texas performed better in reading when compared to white students from seven other states. However, white students performed better overall in all subject areas measured by the achievement exams (Haycock, 2002). This is probably indicative of there being more room for improvement in the African-American student sample.

When looking at objective I Table 9, no relationship, with the exception of Horn (control), could be drawn between schools that used the *SYH Program*® and improvement in TAKS reading scores from 3rd to 4th grade. In fact the treatment schools, on the whole, showed more of a decline in reading scores than the control schools. Although not included in the results tables, Hispanics performed the worst in reading, and this may have to do more with the levels of limited English proficiency (LEP) in migrant families than whether the school used the *SYH Program*® or not (Ravitch,1995; Romanowski, 2002).

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Purpose of the Study

The purpose of this study was to determine if *SYH Program*® had an effect on the motivation and academic achievement of primary school students in Houston, TX. The first objective was to determine if the *SYH Program*® was associated with the academic achievement of students based upon their TAKS scores. The second objective was to determine if the *SYH Program*® was associated with the student's motivation to learn, based upon their attendance records. The third objective was to determine if there was a difference in academic achievement of those students that participated in the *SYH Program*® based upon the demographic variables of gender, ethnicity, and economic status.

Review of the Literature

Environmental Education grew out of the progressive movement in education which began in the late 19th century with the advent of the industrial revolution. Education in primary and secondary schools in the late 19th and 20th century began to shed some of the more traditional teachings in favor of vocational course work that

reflected the job markets needs (Ravitch, 2000; Gorden, 2002). Traditional core academics remained in schools for the college bound, but many subjects such as Latin and Greek, which were considered antiquated languages, were systematically withdrawn from the curriculum, as was History later replaced by Social Studies, which reflected more pressing present needs (Ravitch, 2000).

Out of the progressive education movement a form of education coined "integrated" or "interdisciplinary" began to develop. Integrated curriculums were any curriculum that used an interdisciplinary approach to teaching and was a student-centered approach in which students are invited to join with their teachers in planning their learning experiences. This approach was probably forwarded mostly by John Dewey, a progressive educator in the early 20th century who spawned a number of research schools, most notably the Lincoln School at Teachers College which saw the value in integrating activities into learning traditional academics, as well as inspiring students to take part in the creative process of forming course goals (Ravitch, 2000).

Environmental Education (EE) was first officially defined in the 60's as any educational activity that is "aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to solve these problems, and motivated to work toward their solution" (Stapp, 1969, pp. 31-32). This focus on "activity", the integrated nature of knowledge, the student taking in active role in learning, and self-motivation in EE paralleled much of the thought in the progressive education movement as well as the cognitive and constructivist movements of that followed (Disenger, 1998; Gardner, 1993; Presseisen, 1986).

Research on EE has increased over the years since the Tbilisi Declaration, part of the Intergovernmental Conference on Environmental Education of 1977 (UNESCO/UNEP). The Tbilisi Declaration set specific goals and guidelines to EE educators and researchers (Disenger, 1998). Researchers' focus in the 80's and 90's was the development of Responsible Environmental Behavior (REB) models and studies of attitude, behavior, and knowledge of students in schools that integrated EE into their curriculums (Disenger, 1998; Volk et al., 1997).

The push for national academic standardization in K-12 education in the U.S. solidified further after the passage of the "No Child Left Behind Act 1991" (107th Congress, Public Law 107-110). This act streamlined the process by which national and state standards were set in primary and secondary schools. Under this act, states are given the power to create unified state standards based upon national standards and give mandatory standardized tests to orchestrate student promotion (107th Congress, Public Law 107-110). With schools facing higher accountability, integrated curriculums and environmental education face new challenges in regards to their shape and form, and for that matter, their survival.

A study by the *State Education and Environmental Roundtable* (SEER, 1997) involving 15 state education departments sought to determine the effects that the Environment as an Integrating Context for learning (EIC) model™ would have on the achievement and teaching methods of 40 primary and secondary schools nationwide. The EIC model is simply defined is: "A framework for interdisciplinary, collaborative, student-centered, hands-on, and engaged learning" using the environment as its context for learning (Lieberman & Hoody, 1998, p.1).

Methodology

The purpose of this study was to determine if *SYH Program*® had an effect on the motivation and academic achievement of primary school students in Houston, Texas.

The sample population that was used for this study was drawn from 3rd and 4th grade students in the H.I.S.D in Texas. The schools chosen were those had working certified *SYH Program*® sites. Control classrooms had teachers who did not integrate the *SYH Program*® into their core curriculum. Treatment groups had teachers who integrated the *SYH Program*® into their core curriculum. Control and treatment groups coming from different schools were closely matched based upon the demographic variables ethnicity and economic status. Data for study was provided by the H.I.S.D. (2004) research department.

The research design used in this study was a nonrandomized control group – treatment group pretest-posttest design. Data on sample student academic scores (TAKS), attendance records, and demographic records from the beginning of the fall 2002 semester to the end of the spring 2004 semester were collected and reviewed.

The curriculum, considered the treatment of this study was the Schoolyard Habitats Program® (SYH Program®). Created by the National Wildlife Federation® (NWF®) in 1996, the intention of the SYH Program® is to help interested schools and communities create and restore wildlife habitats on school grounds. The goal of the SYH Program® was to create a cross-curricular learning environment while teaching about wildlife habitat and conservation (NWF® Schoolyard Habitats®, 2001, p.2).

Objective 1

The first objective was to determine if the *SYH Program*® was associated with the academic achievement of students based upon their TAKS scores. There was a weak positive relationship between schools that used the SYH Program and an improvement in TAKS math scores. There was stronger positive relationship between W. University (treatment) and improved TAKS math scores. These results support the findings of the *State Education and Environment Roundtable* (SEER) study (Lieberman & Hoody, 1998) in which the understanding of mathematical concepts improved among 73% of the students' samples when *the EIC model*™ was used in their curriculum. The results also support the findings of the Klemmer et al. (2005) study on the effects of using the *Junior Master Gardner* ™ (JMG™) program as an integrated curriculum on elementary students' math and science academic achievement.

In this study, there was little relationship between schools that used the *SYH Program*® and an improvement of TAKS reading scores, with the exception of Horn (control) which had a statistically significant better performance from 3rd to 4th grade when compared to its treatment counterpart W. University.

Objective II

The second objective was to determine if the *SYH Program*® was associated with the students motivation to learn, based upon their attendance records. In the final analysis, the findings showed no statistical significance between these two variables, and some mixed results at an individually matched level between treatment and control

groups. The change in attendance from 3rd to 4th showed a weak negative correlation between the grades of the matched schools Horn (control) and W. University (treatment), and a weak positive correlation between the grades of Will Rogers (control) and Rice (treatment) groups.

Objective III

The third objective was to determine if there was a difference in academic achievement of those students that participated in the *SYH Program*® based upon the demographic variables of gender, ethnicity, and economic status. Of these three variables, only ethnicity drew any statistically significant correlations in terms of academic achievement. In the final analysis, non-whites displayed a positive association with change in TAKS math raw scores from 3rd to 4th grade. African-Americans showed a statistically significant positive relationship with a TAKS raw reading scores improvement. These findings support Haycock's (2002) research on achievement scores which revealed that African-Americans in Texas performed better in reading when compared to white students from seven other states. However, white students performed better overall in all subject areas measured by the achievement exams (Haycock, 2002). This is probably indicative of there being more room for improvement in the African-American student sample.

Conclusions

Based upon the results of objective I this study shows a statistically significant association between those elementary schools that used the *SYH Program*® and an improvement of AKS math scores. These findings support the research of Lieberman et al.(1998) and Klemmer (2005). One school, Rice (control), did display a statistically significant performance in TAKS reading when compared to its treatment school counterpart, W. University. The possible explanation for this would be the greater proportion of Asians in Horn, who in general, although this is not reported in results, did better in all subject areas. This study shows that TAKS reading scores decreased in all schools with treatment schools actually performing worse, although this was not statistically significant when compared to the control schools. The possible explanation for this would be that math may be more easily integrated into *SYH Program*®.

The *SYH Program*® is designed to be aligned with various national and state standards, math and reading included (NWF®, 2004). Math is used in the design of the habitats and, is used repeatedly within the curriculum to count species distribution and the measuring of plots (NWF®, 2004). In the NWF® guide, *Schoolyard Habitats*: *A How-to Guide for K-12 School Communities* (NWF®, 2004), most of the suggested language arts integration possibilities have to do with writing skills and less to do with reading skills. Thus, the integration of reading into the *SYH Program*® may require additional effort, as it may have one more degree of separation from the *SYH Program*® than math instruction.

The relatively small change in attendance rates from 3rd to 4th grade for all students proved to be statistically insignificant. There were some weak significant

correlations, both positive (Will Rogers (control)/Rice (treatment)) and negative (Horn (control)/W. University (treatment)), at a control-treatment matched level. It became apparent that it would be difficult to use attendance on its own to explain motivation to learn. Some research shows positive correlation between attendance rates and motivation in school children (Brewster & Fager, 2000), but it is also more typical of older children, starting at the middle school age, to display more signs of disinterest in school than with younger children (Lumsden, 1994). This may help explain the generally high attendance rates of the students in this study.

Of the demographic variables explored in this study, ethnicity proved to be the most statistically significant variable in terms of TAKS score improvement from 3rd to 4th grade. One result worth noting was an improvement of the TAKS math scores in minority (i.e. non-white) versus white students. The only conclusion that can be drawn in whether the *SYH Program*® had an influence on the various ethnicities is that the two treatment student samples were composed primarily of minority ethnicities. TAKS math scores from 3rd to 4th grade (Table 6) for Elrod and Rice, with predominantly Hispanic and African-American students, improved more than their control counterparts. Rice (treatment) had the highest TAKS math scores improvement of all student samples. The other statistically significant result is the improvement in African-American versus non-African-American TAKS reading test scores.

These findings support Haycock's (2002) research on achievement scores which revealed that African-Americans in Texas performed better in reading when compared to white students from seven other states. However, white students performed better overall in all subject areas measured by the achievement exams (Haycock, 2002). This is

probably indicative of there being more room for improvement in the African-American student sample.

There was a general decline in TAKS reading scores among all of the schools, and although not included in the results, Hispanics had the lowest TAKS reading scores. Therefore, the large number of Hispanics within certain schools within the research sample accounts for the decline in TAKS reading scores for Allen (control), Elrod (treatment), Will Rogers (control) and Rice (treatment). This is not surprising, as the research would indicate that the Hispanic immigrant community has been documented as having the highest limited English proficiency (Ravitch, 1995, Romanowski, 2002).

Recommendations

The following recommendations are proposed based on the findings and limitations of this study:

1. It is recommended that a future study use variables other than attendance rates to measure motivation to learn.
2. It is recommended that teachers use of a log to measure how much the amount of time each class actually uses the SYH Program® as an integrated curriculum
3. It is recommended that ethnicity is explored more in its relationship to the *SYH Program*®.
4. It is recommended that future studies review actual individual *SYH Program*® school curriculums to determine how teachers use them to integrate into there curriculums..

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VITA

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