USING A SCHOOLYARD GARDEN TO INCREASE LANGUAGE ACQUISITION AND CONCEPTUAL UNDERSTANDING OF SCIENCE IN ELEMENTARY ELL STUDENTS

by

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Bachelor of Arts, 2006
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Submitted to the Graduate Faculty of the
College of Education
Texas Christian University
In partial fulfillment of the requirements
for the degree of

Master in Science Education

August 2012

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to Dr. Molly Weinburgh. Throughout this entire process, she has remained a steadfast pillar of support. No matter how many questions I threw at her, she answered each one with the wisdom and patience expected of an advisor. When I would veer off path or chase an irrelevant rabbit, Dr. Weinburgh would redirect and refocus me. Without her support, I would still be struggling with the literature review.

I would also wish to thank Dr. Ceclia Silva. Her expertise on English language learners was, and is, beyond value. Her professional opinions, ideas, and passion formed the cornerstone of my research. I believe that if I had not met her during my first term at Texas Christian University, I would not have embarked on this discovery with as much gusto or passion as I had.

Both of these women have been invaluable in their wisdom and their cheerleading. I am very blessed to have met them and had them on my research committee.

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Context

There is a large plot of undeveloped land associated with my school. This land is very barren; partly due to the construction method of scrapping the land clear prior to building, and also thanks to the soil composition and native plants in the area. The soil is only an inch or two thick and rests atop of a very solid bed of limestone. The plants native to this area are mesquite, some prairie grasses, and prickly pear cactus. Hardly anything else is able to grow on this terrain for any length of time. The mesquite was removed during construction of the site and never replaced with anything else. Essentially, when you look across the school's acreage, you view a nondescript school building surrounded by a meager playground atop a desolate landscape. How is a child to develop in his or her scientific interests when he/she is presented with such a sterile case study? Richard Louv states the importance of a vegetated landscape best, "our visual environment profoundly affects our physical and mental well-being" (2008, p. 46).

With the new STEM (Science, Technology, Engineering, and Mathematics education program utilized by the National Science Foundation and proposed by the Obama administration) initiative, science has received a renewed focus within schools. My school is no exception; however, this valuable outdoor space remains unused. The students at the school are only exposed to the outdoor environment during their 20 minutes of recess. That experience is confined to lawsuit friendly playground equipment and a "cushioned" asphalt pad. When it is time to learn about life sciences, the students experience these topics through textbook passages, controlled plant examples in a Ziploc bag placed in a window, and short time-lapse videos. They are receiving a cursory and surface level education on a topic that is crucial to their daily lives both in and out of the school environment.

The majority of the students enrolled in this elementary school are low-income Hispanics who reside in the apartments and rundown trailer homes adjacent to the campus. It is common that these students go home to an empty house while their parents work multiple jobs and the responsibilities of running the house fall to the older siblings. When there is time to explore the outside environment unrestricted, these students choose to remain indoors to play with the various electronic and technology-laden gadgets that they own. These battery-powered distractions are far more appealing than the paved spaces surrounding the mobile home parks and apartments (Rivken, 1997).

Statement of the Problem

I have always found myself drawn to the world of science. More specifically, I have found myself gravitating towards science seen everyday. I can lose minutes or even hours observing the migration patterns of geese, tracking the scavenging habits of skunks, capturing the blooming of a moonflower on film, and all other matters of natural phenomena. I constantly seek out trivia, studies, and facts concerning a vast array of scientific topics. As far as I can remember, when I was in the public school system, my teachers fostered that love and desire to learn. If I asked a question that they could not answer, they would promise to have an answer the following day or guide me in a direction to discover it myself - and they would remain true to their promises. I was constantly full of questions. This curiosity has been one of the main reasons I took up the torch and became a fellow educator.

In the midst of my first two years of teachings, I was disheartened with the lack of natural experiences, background, and curiosity that my students exhibited during the daily science hour. It became apparent that they just wanted to perform the “experiments” and move on. To them,

science was just a magic show full of neat little tricks. Being that it was my first two years of teaching when I was learning what did and did not work, I pushed that disappointment aside and focused on surviving.

After those first two years, I relocated to my current school. The first year I focused on learning all the policies, legislation, and techniques to support my English language learner (ELL) population. Yet, I am a very quick learner and once I became comfortable in my new position, the disappointment that I experienced in my first two years came back with a vengeance. When I pulled my students out during their science and social studies periods, I was constantly shocked with the lack of outdoor experiences that low socioeconomic students have access to. How was I to provide my students with the support they needed to develop their academic language and be exited out of the program when they did not even have the background knowledge necessary to understand and build science topic upon? Due to the pressure on classroom teachers to prepare their students for the TAKS, and now the STARR, tests in the spring semester, science is often pushed to the side with the thought that it will be returned to at a later date. Most classroom teachers do not realize that this is detrimental to their students and especially to their ELL population.

Watching my students flounder in life sciences, which is the most concrete out of all the sciences in elementary schooling, and seeing this unused outdoor space that holds so much potential, led me to my interest in my research question. What if someone with a passion for not only science but educating the underserved students began adapting and utilizing this outdoor space to teach the life sciences? As a result, my school found itself with a donated, raised bed garden at the beginning of the fall semester.

Research Question

This study looked at a small cross-section of the school population. Specifically, it looked at kindergarten through third grade students enrolled in the English as a Second Language (ESL) Program. These students are pulled out of their general classroom to receive English support within the content area of science. They are not only responsible for learning the mechanics of the English language, but also for the content that they will be tested on using the state assessments in fifth grade. Therefore, this study examined the effectiveness of using a schoolyard garden to gauge academic language within science in elementary English Language Learners (ELLs). How effective is the use of a garden on academic language development and academic science conceptual understanding of ELL students once they have participated in a focused life science unit of study?

Definitions of Terms

For the purpose of this research, the following definitions will be used:

BICS

Basic interpersonal communication skills (BICS) is defined as the social language that is easily accessible by the students and helps them interact in social situations within the classroom. It is the conversational fluency of the students.

CALPS

Cognitive academic language proficiency (CALP) is a descriptor of English language proficiency that students must achieve in order to receive maximum benefit in academic instruction settings. It is also known as academic language proficiency.

Academic Language

Academic language will be defined as the language of the classroom from formal vocabulary and correct usage of language concepts to participation in classroom discussions at the academic level.

Science Vocabulary

Science vocabulary will be used to describe the science terms and vocabulary of academic science.

Science Language

Science language is defined as the distinct way of knowing and expressing oneself in science.

ELL

English Language Learners, ELLs, refers to students who have a native language other than English.

TELPAS

The Texas English Language Proficiency Assessment System (TELPAS) is the assessment protocol used statewide to assess the academic proficiency in four language domains (listening, speaking, reading, and writing). For the purpose of this study, first through third

grade students were identified in each language domain based on the TELPAS 2011 administration.

ELPs

The ELPs are the English Language Proficiency Standards that outline the academic language students should need to master in order to be successful in school. For the purpose of this study, I have chosen to use both the Texas ELPs (Texas Education Agency, 2011) and the ELPs provided by the World-Class Instructional Design and Assessment Consortium also known as the WIDA Consortium (Gottlieb, M., Cranley, M., & Cammilleri, A., 2007).

Chapter 2

English Language Learners

Students who are ELLs have the benefit of speaking a native language other than English (Teachers of English to Speakers of Other Languages, 2006). These students are educated in an English classroom with some form of ESL support or are educated through a form of bilingual schooling in which the end result is to produce students whom are fluent in both the native language, typically Spanish in Texas, and English (Settlage, Madsen, & Rustad, 2005).

Due to the enforcement of No Child Left Behind (NCLB) and the large ELL population within Texas, the Texas Education Agency needed to create an assessment system to gauge the progress of its ELL students. TELPAS was then created to be administered in the spring term of every school year until the student achieves the designation of "Advanced High" in all four language domains, or successfully meets state exit criteria and is then labeled "non-limited English proficient" (Texas Education Agency, 2011). A child enrolled in school, first grade up to twelfth grade, will have been identified in each language domain from the previous year's administration. In this case, the TELPAS 2011 administration will be used to make initial language designations. All students still enrolled in the program the following year will take the TELPAS administration for that year (TELPAS 2012) and will receive new language domain designations in all areas. According to the recommendations of the school district in the study, students should make one level of growth in each domain every academic year.

The ELPS outline the academic language students need to master in order to be successful in school. While Texas has a set of ELPS, I have chosen to use both the Texas ELPS and the ELPS provided by the World-Class Instructional Design and Assessment Consortium (WIDA Consortium). These ELPS are more focused and "are typically less measured by a test

but are important to teaching and learning" (Gottlieb, Cranley, & Cammilleri, 2009, p. 11). When using the ELPS, it is important to note that both sets are broken down into classifications based on language acquisition levels. Texas ELPS have four classifications while the WIDA Consortium uses five model performance indicators. The difference being that Texas has taken the two lowest indicators (Entering and Beginning as found with WIDA Consortium) and combined them to create one level, "Beginning." Both organizations provide rubrics for educators to use when evaluating the language acquisition levels in each domain.

Cummins is one of the foremost experts on ELLs and the language acquisition that occurs. Most, if not all, researchers and educators recognize his theories on BICS and CALP. Cummins (2000) differentiated between BICS (social language) and CALP (academic register of language). According to his theory, BICS is the language that is easily accessible through social interactions. It takes approximately two years for an ELL to achieve communicative competence. BICS are more understandable when context is added because it occurs in contexts that offer a wide range of meaning cues. This set of language is much like an iceberg and only represents the visible 10% of language proficiency of an academic learner (Cummins, 2000; Gibbons, B., 2003; Roessingh, 2006; Roessingh, Kover & Watt, 2005). The remaining is considered to be CALP and is recognized to take approximately five to seven years to compete with native speaking peers. Within both the realm of BICS and of CALP there are two dimensions of language—cognitive demand and context (Cummins, 2000; Gibbons, B., 2003; Roessingh & Kover, 2003). The more cognitively demanding the language is, the more the student must rely on the context in which the language is found. Obviously, as students progress through grades and the knowledge and language becomes more difficult, the ELL student is forced to manipulate language in increasingly more demanding content situations with less

context to rely on (Cummins, 2000; Gibbons, B., 2003; Gibbons, P., 2003; Roessingh et al., 2005). Developing academic proficiency is a timely and uneven process. ELLs are chasing a moving target that becomes progressively more difficult as they move through the grades and they are constantly attempting to close the language gap between themselves and their native speaking peers (Roessingh & Kover, 2003; Roessingh, Kover & Watt, 2005).

Research concerning ELL students and ESL programs is vast, but not concentrated to one specific topic. However, as Roessingh and Kover (2005) pointed out, countless studies have been conducted to explore academic achievement for ESL learners but "few studies have explored the development of English-language proficiency required to achieve academically on par with native speaking (NS) peers" (p. 2). As seen with the initiative taken by NCLB to include ELL students in academic measures, it is important to understand language proficiency and its effects on learning. All students must continue to develop their English upon entering schools, but ELL students perform a double duty. Not only are they still acquiring English and developing literacy skills that are already close to developed in their native speaking peers, but they have to learn to decipher information given to them. These students must learn to locate, interpret, and apply information in academic texts. They must then be able to ask, answer, explain, describe, and share with their peers while still using a language they do not have mastery of—a language that is still developing (Carrier, 2005; Gee, 2001).

Multiple studies have been conducted to decide the best possible teaching techniques and strategies to use when instructing ELL students. When introducing new information to ELL students, it has been successful to use analogies that represent the content, utilize activities that encourage construction of knowledge, employ inquiry based lessons, and adapt a hands-on pedagogy (Aschbacher & Alonzo, 2006; Buxton, Lee, & Santau, 2008; Fradd, Lee, Sutmann, &

Saxton, 2001; Lee & Fradd, 1998; Medina-Jerez, Clark, Medina, & Ramirez-Marin, 2007). Several studies indicate that when utilized correctly and appropriately, science notebooks are a beneficial tool to aid in teacher monitoring and facilitating of language development as well as allowing ELL students who shy away from verbal expression to expand their understanding of science concepts and inquiry processes (Aschbacher & Alonzo, 2006; Buxton et al., 2008; Medina-Jerez et al., 2007; Ruiz-Primo, Li, Ayala, & Shavelson, 2004). In a study conducted by Roessingh, Kover, and Watt (2005), it was found that students who received direct ESL support mastered academic language proficiency, while those ELL students who were given virtually no assistance remained at-risk well into post-secondary school. For students who still possess a beginning proficiency of the English language, it has been found to be beneficial for those students to express the science concepts through oral reports as well (Medina-Jerez et al., 2007). However, to have a complete understanding of the best methods to teach ELL students, especially within science instruction, further research will be necessary (Medina-Jerez et al., 2007).

Academic Language

The term "academic language" is multi-faceted. As the body of research on English language acquisition has increased, the definition has taken on a greater depth. According to Gee (2004), academic language is "within specific social practices and not on literacy as a general thing or as only reading and writing…[but] fully embedded in and integrated with learning, using, and talking about specific content" (p. 13). This language allows the students to be a full participant in all areas required to be successful within the academic arena from reading a textbook to engaging in oral classroom discussions. It is the language of the classroom.

Children must learn to use language in a variety of cultural and situational contexts as well as for a range of purposes from presenting information to sharing ideas with peers (Gibbons, P., 2003). Choose any academic subject and not only will you find academic language used to communicate to educators and peers but also language specific to that area of study. To truly grasp content-specific language, it is necessary to not only learn the academic language but the grammatical structure (both written and oral), the vocabulary, and the context in which it is used (Baumann & Graves, 2010; Cummins, 2000; Freeman & Freeman, 2009).

Language does not simply refer to the constant communication between peers, students, and teachers. It is also necessary to do science and construct understandings in science. "Language is also an end in that it is used to communicate about inquiries, procedures, and science understandings to other people so that they can make informed decisions and take informed actions" (Yore, Gay, & Hand, 2003, p. 691). Science vocabulary, as with any content-specific vocabulary, is unique to the subject of science. These are the words necessary for ELLs to understand conceptually in order to be successful at interpreting the dense and compact language of science. Most students, including native speakers and ELLs, understand that scientific discourse is a highly specialized type of English, and is unlike the daily English they commonly use. It is an intimidating formal language (Rollnick, 2000), and represents a distinct language that is pertinent to the academic success of all students from the time they are in school and beyond (Honig, 2010). Yet, even though all can agree that ELLs need to have a mastery of these specific vocabulary words such as "condensation" and "metamorphosis," these words "when carefully defined for the purposes of science learning" mean a variety of concepts within different contexts and different groups of people (Dawes, 2004, p. 678). Within the realm of scientific discourse lie other skills that must also be mastered by all students. These skills

include being able to correctly employ general nouns, nominalizations, and past tense verbs, as well as the ability to create summaries, experimental ideas, metaphors, and dense terminology (Dawes, 2004; Honig, 2010; Young, 2005). Additionally, science has certain language routines that students need to understand to access scientific ideas. They must be able to hypothesize, reason, explain concisely, predict, rephrase, and make decisions based on the understanding they have come to. "Thus, students' success in the domain of science is necessarily linked to their fluency with this specialized discourse" (Honig, 2010, p. 23). We must remember that ELLs are acquiring basic English skills, from vocabulary to grammatical structure, at the same time as they are expected to learn an additional technical language, the language of science. It is very common for an ELL student to struggle under this academic instruction and come to the science classroom unprepared to navigate the factual and expository texts of science. However, once a student is able to successfully navigate the academic science language, including all the routines and structures therein, they are on their way to becoming a master of reading, writing, listening, and speaking like a scientist (Carrier, 2005; Young, 2005). Not only is an ESL teacher providing students with the scientific vocabulary and concepts needed to master the skills for that particular grade level, but that teacher is also laying the foundation for the student to become a knowledgeable and literate purveyor of science (Jimenez-Silva & Gómez, 2011).

Science

It is important to note that the more a student's science knowledge increases, the more precise and specific the vocabulary becomes (Fradd, Lee, Sutmann, & Saxton, 2001). When a student is pushed to express the academic concepts gained in writing, it has been shown that as long as the writing is purposeful and relevant, it can improve a student's learning and

understanding of the concept explored (Ruiz-Primo et al., 2004). To become successful and proficient in science, a student must not only be able to verbally reiterate the concepts in a cohesive manner but also be able to read and write various genres within the subject.

There has been much research conducted on science; however, for the purpose of this research, limiters such as ELL, limited English proficient, and ESL were employed. These limiters vastly reduced the amount of available research down to a handful of relevant articles. Casas and Tamargo (2000) conducted action research with the goal of determining if science learning and language acquisition can be combined. The conclusion of this study is that when a constructivist approach is used, science learning and spoken language acquisition is successful. In that same year, Aladro and Suarez (2000) attempted to determine how limited English proficient students acquire the language of science. They determined that ELL students do not need to have a mastery of the English language to read science information but learning is best when it is through an engaging experience. In two different studies, ELL language proficiency and critical thinking skills were evaluated through a hands-on, inquiry based approach. These studies found that English acquisition is complimented by the scientific inquiry process, engages higher order thinking skills, and increases conceptual science development (Bagley, 2000; Stoddart, Pinal, Latze, & Canaday, 2002). Vogl (2000) researched the use of discussions in an ELL classroom to increase science learning. He discovered that students gained not only confidence in their spoken language but also began to ask more authentic questions regarding the science content. Barman, Stein, McNair, and Barman (2006) surveyed kindergarten through eighth grade students and discovered that there are many misconceptions and an incomplete knowledge basis in this range of students when addressing concepts concerning plants. They stated that children build their biological concepts and understandings through direct, concrete

experiences, ones that they are not receiving within the current school curriculum. Students' understandings of plants and what plants need to thrive are often very limited and basic. "It is also important to know the difficulties young students have with life cycles since they tend to forget the egg stage and the cycling of life stages" (Magntorn & Hellden, 2007, p. 68). A different approach was taken by Goetz and Stein (2008) in their research. Instead of studying different strategies, they designed a set of true/false questions that assessed a variety of science concepts spanning life, Earth, and physical sciences in third, fourth, and fifth grade students. Assessments in this study showed that students were able to connect concepts spanning various contexts learned throughout the year. However, these connections illustrated many misconceptions within science understanding that the students continue to carry with them as they progress through school.

Science is not just a matter of understanding the concepts and being able to relate them to others; it is the process of making meaning of the knowledge and vocabulary. Science activities are an invaluable way in which educators can guide students to visualize and experience natural science phenomena that adds to their background and developing concepts.

School Gardens

With the recent push to increase awareness of child's nutrition and to combat obesity, school gardens have begun to increase in popularity among school districts and researchers alike. Gardens are useful to teach subjects such as science, mathematics, health, and environmental education in a hands-on manner that typically engages students. According to Malone and Tranter (2003), outdoor education is defined as teacher initiated opportunities to supplement the indoor formal curriculum with an equally effective outdoor component. School gardens are only

one possibility in moving the science curriculum outdoors, but they are living laboratories where students can manipulate materials, visualize the concepts they have only read about, and apply these concepts in a real world situation (Klemmer, Waliczek, & Zajicek, 2005b). When utilized properly, these places within the school grounds promote development and learning that allow students to connect new information into their everyday lives. They encourage cognitive activities that are pertinent to successful science such as observing, questioning, exploring, and interacting with nature. School gardens have the potential to provide a rich, formal learning environment that can be explored outside. "School grounds provide access to real-life natural experiences (for example conceptual exploration of living, and non-living things, interdependence, biodiversity, life-cycling, recycling and food webs)—the possibilities are endless" (Malone & Tranter, 2003, p. 289).

Previous research has shown that outdoor education programs and gardens provide many benefits to learners including increased awareness of the environment, improvement in science achievement, and nutritional awareness. However, very little research has been conducted to illustrate the impact of a hands-on garden approach on improving academic language and concepts in ELL students. Cronin-Jones (2000) designed and implemented a study that examined the effectiveness of using schoolyards to teach students about ecological concepts. She found that the elementary students learned more and developed better attitudes towards science when they were taught through schoolyard experiences rather than through traditional classroom methods. Malone and Tranter (2003) conducted an action research study to observe and record the perspectives found using school ground sites in Australian schools. They discovered that there are different perceptions surrounding school ground sites. The overall perception is different for each location because it is a combination of teacher use, school policy,

and design of the school grounds. Should school grounds become a significant player in education, they suggest that there needs to be a more concrete perception of these sites for learning because it makes pedagogical sense to utilize the direct and indirect experiences of nature to acquire environmental knowledge. The purpose of the study conducted by Carrier Martin (2003) was to examine the effects of outdoor science experiences on knowledge, attitudes, and behaviors of fourth and fifth grade students. He found that there was no significant difference in the experimental group of fourth graders over the control, but there was a statistical difference in knowledge gained and the attitudes expressed by the fifth grade experimental group. Yet, another study focusing on students in fourth and fifth grade (with the addition of third grade) was conducted by Waliczek, Logan, & Zajick (2003). The purpose of this research was to study the impact of outdoor education on elementary students focusing on math and science attitudes as well as critical thinking skills. The results determined that there is positive support for outdoor programs that utilize mathematics and science. Students are successfully able to perform at the higher taxonomic levels of Bloom's Taxonomy, even after time had elapsed from the initial experiences. In 2005, a case study of elementary students was undertaken by Brody. From the case study, it was learned that interacting with nature in a learning environment emphasizes action, reflection, emotion, and experiences that accompany the learning. Dyment (2005) conducted a meta-analysis on previous studies utilizing outdoor green spaces for learning sites. She found that, despite a few barriers, the benefits of utilizing these spaces outweigh any of them. However, school districts and teachers need to receive more comprehensive staff development on the most effective uses for these outdoor spaces in order to best benefit the students. Klemmer et al. (2005b) conducted a study on the effect of school gardens on science achievement of third, fourth, and fifth grade students in a Texas school

district. They found that students scored significantly higher than the control group on the science achievement test that was administered after the conclusion of the study utilizing gardens. Magntorn and Hellden (2007) conducted a study using a Swedish primary school to study the effectiveness of utilizing a bottom-up teacher approach with an outdoor unit on ecosystems. The results from this study suggest that using a bottom-up approach increases understanding and student connections to the science content being taught. The students are able to create a stronger understanding of cycles and relationships that are natural occurrences in the environment. In 2009, Blair implemented a study of current school garden research in which she found students are better motivated, show improved attitudes, community involvement increase as well as nutritional awareness rises when gardens are employed. These school gardens also encourage exploration of natural phenomena that have otherwise been neglected in the standard-driven climate of current school education. Also in 2009, Carrier studied the impact of environmental education lessons taught both in the traditional classroom and within the schoolyard on fourth and fifth grade boys and girls. She found that the boys were more successful in the schoolyard environment than the girls. However, both the boys and girls taught in the schoolyard were more successful than their counterparts instructed in the traditional classroom.

Since history has been recorded, humankind has been obsessed with naming objects. There is a power in knowing the name of something when it is being manipulated. Children are being denied that experience as they are retreating more and more into the safe abodes of their classrooms and homes. When these children are not interacting with the natural environment around them, they are missing out on the wealth of knowledge that is encapsulated in the local flora, fauna, and environment that offers many opportunities to develop skills and knowledge

that enhance everyday classroom experiences (Dillon, Rickinson, Teamey, Morris, Choi, Sanders, & Benefield, 2006; Rivken, 1997). Providing them with these experiences, even in the confines of a school setting, and allowing them to learn the names will build an interest and thirst for more knowledge about the "mechanisms supporting the life in the ecosystem and the relations between populations" (Magntorn & Hellden, 2007, p. 75). Once this fire is lit, these "out-of-classroom contexts can provide new connections with science and stimulate people to think more deeply about science and its relationships with society" (Braund & Reiss, 2006, p. 220). It is easy to see through the established research that school gardens provide students and teachers with a multitude of benefits.

As mentioned by Rollnick (2000), "English is regarded as indispensable for communication of science internationally and for explaining clearly the concepts of science" (p. 100). Inquiry based science, such as that which stems from interacting with a school garden, provides a fertile context to build understanding and language skills (Hapgood & Sullivan Palincsar, 2007). Studies have been conducted illustrating that academic language proficiency and science content are complimentary and should be taught together. Other research has shown that hands-on experiences in outdoor and garden environments reinforces the scientific concepts encountered in the traditional classroom. However, what is the effect of using them with the purpose of improving both academic language and science conceptual understanding? Klemmer et al. (2005a) also stated that there is an abundance of research concerning the general benefits of school gardens but that there are few studies that have looked at gardens being used as a curriculum tool for academic pursuits.

Chapter 3

Research Paradigm

For the purpose of this study, I have adopted the constructivist paradigm with an addition of one of the main underpinnings from Vygotsky's Sociocultural Theory. Working with ELL students has introduced me to the best learning strategies that not only enables the students to successfully develop the knowledge and concepts needed in each grade level but also to develop the CALP necessary to be successful in the current grade and beyond. These learning strategies tend to be derived from constructivist ideas.

ELLs make use of nonverbal communication to understand and communicate. This means that active, group learning situations taught through a variety of learning activities that include kinesthetic, active, and hands-on are the preferred methods for not only the students but the teachers. "When learners actively engage in learning rather than passively receive knowledge from experts, comprehension of content occurs because students can develop conceptual understanding" (Gibbons, B., 2003, p. 372). Since this study required students to develop their academic language and their science concepts and science vocabulary, it was important to include as many hands-on, active and kinesthetic lessons as possible to aid in the concrete formation of this bombardment of knowledge on the ELL students.

According to the theory of constructivism, active learning appears to be one of, if not the, key principle. It leads to students that are highly engaged in problem solving activities that are applicable to real world settings. Students must find these activities relevant and engaging in order for this theory to be appropriate. Student-centered learning is strongly advocated using such strategies as differentiating learning styles, allowing students to build their own funds of knowledge, and base their experiences on personal contexts (Klemmer, Waliczek, & Zajicek,

2005b). One of the hardest hurdles to overcome in teaching ELL learners is that of motivation. It is virtually impossible to develop language and concepts when a student finds the subject matter boring and irrelevant. When the teacher takes on the role of facilitator and guide, students tend to place more investment into their learning since they are the ones in charge of it.

Students need opportunities to construct their own knowledge. They are able to do this by using prior knowledge with experiences and incorporate them into new ideas that have been gained. It is important to note that "knowledge is constructed by the brain through situational and experimental encounters that are influenced to a large degree by pace, content, connectiveness, prior understanding, and the student's ability or freedom to act on the learning" (Gibbons, B., 2003, p. 372).

The sliver of sociocultural theory that appears applicable to this study states that cognitive development requires social interaction. "English learners should be taught in a setting in which they can work together to solve problems and produce projects" (Gibbons, B., 2003, p. 375). This idea ties into constructivism; however, it stems from Vygotsky and his zone of proximal development. Additionally, ELL students, specifically Hispanic students with diverse language backgrounds, are "field-dependent learners [who] respond to experiences in terms of the whole instead of isolated parts" (Gibbons B., 2003, p. 371).

Method

Participants

The participants for this study were a convenience sample taken from my own roster. The elementary students participating spanned the range of kindergarten to third grade and the ages of five to eight. These students were all listed as LEP according to their Home Language

Surveys collected upon enrollment into the school district. Upon further identification testing using Ballard & Tighe IPT I—Oral English Language Proficiency Test, these students were determined to qualify for the ESL program in Midlothian Independent School District.

All ELL students in kindergarten through third grade received a consent form, but a stratified random sample was taken once forms have been returned. Within this group of elementary students, there was a total of 16 participants. There were three students from each grade selected to participate in the study. Using TELPAS ratings from 2012 and results from 2011 TELPAS (for first through third grade students), a Beginning, Intermediate, and Advanced/Advanced High student were selected from each grade level.

Consent forms were sent home in early February to the parents and guardians of these students to obtain permission to participate in the study. In addition, photo releases were also sent to parents. The data collection began in the spring semester in March and concluded in mid-April.

Data Collection

Four forms of data were used in this study: archival, pre-test, post-test, and journal. Pre-assessment of the students' science academic language was gathered through archival data collected at the beginning of the school year for assessment purposes. A pre-test/post-test assessment was given to the students that included concept mapping (2^{nd}-3^{rd}) or picture manipulation (K-1^{st}) of various cycles illustrated through the garden experiences such as life cycles, food cycles, and the scientific method. Kindergarten and first grade received assessment through recorded oral interviews while second and third grade received an added component to their assessment via traditional paper and pencil means. The pretest assessments determined a

base line for the academic science language that included word recognition, cognitive language, and linguistic language of the students as well as each one's understanding of scientific concepts regarding life cycles, ecosystems, and habitats. Throughout the duration of the study, students kept journals (grade appropriate) that were used for additional data collection. Photographs and oral interviews were utilized to add to the qualitative data necessary for the study. The post-tests illustrated the outcomes of the study interventions be it an increase in academic science language, no effect, or a decrease. Each student chose several photographs taken during the duration of the study and created a summative oral report that was then recorded to assess the student's oral academic language.

Data Analysis

A set of scientific concepts that were encompassed by the study were determined prior to the data collection period from the standards covered by the Texas Essential Knowledge and Skills standards (TEKS), National Science Education Standards, and World-Class Instructional Design and Assessment (WIDA) ELPS. A rubric was used to analyze the individual student's level of academic language before and after the study where students were listed on a spectrum from entering to bridging according to the WIDA descriptors. Rubrics were used to assess the journals, concept maps, and summative oral reports to determine how well each concept was mastered both conceptually and linguistically.

Chapter 4

This chapter presents the results of the research regarding the utilization of schoolyard gardens and ELL students. It is divided into subsections that outline the curriculum and scoring system. It also includes backgrounds on each of the participants, a description of the results for the pre- and post-tests and some observations on the use of words.

Overview of Method

The curriculum

The curriculum utilized within this study was adapted from the district recommended curriculum, AIMS Primarily Plants. The state standards in science (Texas Essential Knowledge and Skills) and the English Language Proficiency Standards adopted by Texas also guided the choice of this particular curriculum. For each grade level, the TEKS objectives were used to determine what each grade level was most responsible for learning in terms of garden curriculum. Prior to creating the pre-test/post-test assessment, I developed content rubrics for each grade level that focused on delineating grade-appropriate objectives. These rubrics also familiarized me with the curriculum that composed the unit used in this research. I was able to determine that the best instruction method would be through a bottom-up approach in all grade levels developing the basic foundation of knowledge prior to larger, more abstract and less tactile concepts. The unit was divided into three parts with the academic vocabulary and outdoor experiences in the garden interwoven throughout all three sections: parts of plants, plant systems and needs, and interdependence of plants with humans. The age-range of the students as well as experiences determined the depth of each of the three sections. Due to the various grade levels, there was no exact timeline spent instructing in each of the areas since it was dependent on

several factors: age, engagement, level of background knowledge. Generally, the older the grade, the more in-depth and longer the lessons went due to background knowledge acquired from the spiraling curriculum in previous years.

Each participant was given the appropriate pre-test prior to the first day of study. The results of the pre-test and observations from the researcher were recorded on the cover sheet of each assessment. At the completion of the unit, the participant was given the post-test that was the exact same assessment as the pre-test. Once again, the observations and results were recorded on a cover sheet to use as a comparison between the two assessments. Since this was an action-based study, there was no pilot test nor was there any previous validity or reliability from the assessment. The assessment questions were derived from the established curriculum and academic vocabulary lists by using higher-order questioning, multiple choice, manipulated puzzles with labels, sorting activities, charts, drawings and photographs. For both the pre-test and post-test assessments, each participant was encouraged to explain his or her thinking behind the answers chosen to further shed light on misconceptions and previous understandings.

Scoring

With the aide of the campus science coordinator and my co-teacher, I drafted an academic and content vocabulary list with definitions for each grade to ensure that the expectations were appropriate for each age range. These lists enabled me to listen for correct usage of these words during pre-test/post-test assessments as well as focus on direct instruction within the unit. For the pre-test/post-test and summative assessments, these words were listed in checklist format with approved definitions and keywords out to the side. The chosen academic language was outlined in the lesson plans with days of introduction and review clearly marked so

that I would be certain, at a glance, what words were to be introduced that day and what words needed review and repetition. Repetition during this study was key as it is an approved technique for ELLs. The more the students heard, used, and experienced the unfamiliar words, the better they were able to retain them.

During the course of the unit, the students were encouraged to utilize the academic vocabulary in their interactions, responses, and daily assignments instead of the broad, general vocabulary typically used. The foundation for this procedure is grounded in reloading language, according to Weinburgh and Silva (2012). Reloading language fosters "personal and social negotiation as students interact with words that have previously emerged within a rich context" (Weinburgh & Silva, 2012, p. 10). Each lesson would consist of a brief summary to outline the goals of the day, a review of previously learned material and words, and followed by a hands-on, interactive lesson conducted within the garden or schoolyard (weather permitting). Whenever possible, although time-constraints proved challenging, the lesson of the day was reviewed prior to dismissal. At the end of each of the previously mentioned divisions in the unit, a summative, informal assessment such as a layered book or poster would be created to further cement the knowledge within each participant. This process continued for 20 days from the middle of March to the end of April.

At the conclusion of the unit, each student was presented with a collection of all his/her work and photographs taken each day during the unit. While the post-tests were being conducted, the students created a portfolio to display all their work. They also were presented with a photo album to place all their photographs within. Prior to inserting the photographs, the students were instructed to choose their three favorites. Using voice recorders, the students placed the photos in chronological order and then described the photograph, what they remember

learning, and why they chose that particular image. I chose to do this orally so that the students would be able to explain in greater detail using as much knowledge as possible than they would if it had been a written assignment. The photographs were taken so that each photo clearly illustrated the concept of the day to trigger memories during the summative assessments. Kindergarten and first grade students required more assistance with both the portfolio and the summative assessments. In order to successfully complete the assignment with the kindergarteners, it was necessary to ask guiding questions to help them focus their answers. The older two grades were able to complete both the portfolio and the summative assessments without much teacher assistance.

Description of Results

Participants

Kindergarten beginner. This student has been in HeadStart since he was three years old but academically functions below grade level. At the beginning of the year, he only could speak in one-word sentences. At the start of the study, he was beginning to speak in six or seven word sentences. He is a very talkative and social student. He also is ADD and wants to learn but is unable to focus for long periods of time. At the conclusion of the school year, he still only knew five sounds and letters. At the beginning of the study, this student had a very limited understanding of plants and gardens. His experiences with plants and gardens were very brief and most of what he knew, he stated came from movies. Throughout the unit, he became increasingly engaged for longer periods of time. By the conclusion of the study, he was able to distinguish between different plant parts as well as use the correct vocabulary in his explanations. There was still much he did not know about plants parts and life cycles as well as

academic vocabulary at the end, but it was obvious that he was beginning to develop a strong foundation.

Kindergarten intermediate. This student was in her first year in the ESL program; however, she attended ESL summer school prior to beginning kindergarten. She is the youngest of nine siblings in a home where Spanish is the only language spoken unless she is communicating with one of her siblings. Her family gets by with the resources they have but it is the older sibling who take on most of the adult responsibility with the younger siblings. Parent involvement is very minimal due because the oldest sibling suffered a traumatic brain injury and receives around the clock care. At the start of the study, this student had limited knowledge of plants, their purposes, their functions, and gardens. She categorized everything as living when asked to sort items between living and nonliving. Throughout the study, she made progress determining the parts and functions of plants. She also became more confident in her vocabulary and started taking greater risks by using some of the academic terms that were taught. By the end of the trial period, she was confident with the more common functions of plants and was able to articulate their importance and purposes. She still struggled with the academic terms but she had mastered four out of ten.

Kindergarten advanced/advanced high. This kindergartener has been in ESL since HeadStart and she is the first child in her family to enroll in school. She is very eager to learn and always wants to be right. She is one of the highest performing kindergarteners in her homeroom with very strong social skills. Yet, there are large gaps in both her social and her academic language. These gaps are more apparent in her academic language. This student had more background knowledge than any of the other participating kindergarteners. During the pre-test, she was able to articulate her answers but they were circuitous. By the time she was tested

with the post-test, she was able to accurately and succinctly answer the questions and complete the activities using appropriate academic language. Throughout the duration of the study, this student would take pride in showing the class everything that she remembered from the previous day. Because she was very verbal and unabashed, she experienced more repetition and practice with all the concepts learned than her peers in the study.

First beginner. This student is immature compared to the peers in her group. This was her first year in the ESL program. She comes from a home that uses limited English and her mother never completed high school. This student wants to expand her ability to communicate but does not know how to do so appropriately. She lacks vocabulary and resorts to detailed explanations to describe the majority of ideas she is trying to explain due to limited word banks. This results in her peers losing interest and her becoming frustrated. Often times, she will appeal to the educator for assistance in best conveying her thoughts. Prior to teaching, the pre-assessment showed that this student had a solid understanding of plants. There were some misconceptions, such as a tree and flower being nonliving and using soil in an image to determine if something was a plant or not. Through the unit, this student always connected the day's lesson to some story that she remembered and would insist on retelling to the group. The other first graders would help her with her English to express correctly the sentence she was attempting. While she did not have much room for growth on four of the six objectives, she did master two of them at 100% on the post-test assessment and was able to correct her misconception about trees and flowers. She also went from using the image of soil to determine if something was a plant or not, to using parts of plants that she had learned about as the determining factor. Most impressive was her use of academic vocabulary, which was only at

20% for the pre-test. By the end of the four-week period, she was able to correctly use the vocabulary she had learned 80% of the time.

First intermediate. This student has been in ESL since she was a kindergartner. She was placed in the program because her mother refused the bilingual program and Spanish is spoken primarily in the home. Her social language is just now beginning to fall into place. This participant lacked understanding and mastery of the language to explain her reasoning on the pre-test assessment. She was only able to identify leaves as part of a plant and was unable to explain the purpose of any part of the plant because she did not have the language needed to convey ideas. During the curriculum, she was very engaged but still struggled with the language needed to convey meaning. Her peers would often assist her so that she could explain what she was trying to say. At the conclusion of the unit, she had more vocabulary in place so that she was better able to convey meaning. There were still some misconceptions that she carried with her throughout the entire unit but she was able to identify and describe the purpose of each plant part as well as the needs of plants.

First advanced/advanced high. This first grader has been served through ESL since she was enrolled in kindergarten. Her social language is in place but her academic language is not. This might be due to the fact that she has the desire to be the brightest one in the classroom and will not take a risk if it means there is the possibility of making a mistake or being wrong. In her home, there is not a strong English or Spanish language model. The English that is spoken is very limited. In her pre-test, this participant lacked the vocabulary to explain her reasoning as she completed the various activities. She was able to use words such as “stem” and “root” but was unable to go beyond this or explain in any depth. Her post-test demonstrated an understanding and mastery of concepts at 80% or higher. She had the vocabulary necessary to

explain her answers and was able to successfully utilize all the academic vocabulary that a first grade participant needed to know. She still carried some misconceptions throughout the curriculum, but her reasoning illustrated how these came about. For example, she placed a light bulb on the side that denoted needs of plants and then explained that the "light bulb gives it light just like in the hallway." A growlab was utilized in the hallway to start seeds prior to transplanting them in the garden and most likely contributed to this misconception.

Second beginner. This student has been served through ESL for three years. Only Spanish is spoken in the home and his mother is an employee within the school district. ESL was chosen over the bilingual program because his Spanish is not strong enough to be successful in the bilingual program. He has ADHD but his medication doesnot take effect until midmorning. The second graders are pulled for the ESL time first thing in the morning. In addition to being unable to focus, he has severe dyslexia and shows many obsessive-compulsive tendencies. On his pre-test, this student was able to provide some reasoning behind his answers but lacked the academic vocabulary to add detail to his explanations. He had the basic academic vocabulary that was learned in first grade but not the second grade academic vocabulary. His answers were also the basic first grade answers that he remembered from the previous year. On his post-test, not only was he able to use more academic vocabulary in his responses, he was able to explain concepts more abstractly. His results showed a much stronger grasp of the concepts and a more confident use of the science language. Whenever it was appropriate, this student would use the vocabulary that was taught through out the unit such as "photosynthesis," "thrive," and "germinate." He was able to articulate his justification behind his responses with clarity and extended his justification to examples that were not taught in the unit, such as a cactus is a thick stem with sharp, tiny leaves.

Second intermediate. This was the first year in ESL for this particular student. She is the youngest of two. Her mother is raising three other families within the community whose parents work multiple jobs, which means that she does not get much attention outside of school due to the demands placed on her mother. Most of the time, she appears vacant and inattentive, so it is difficult to tell if she is actually paying attention to the lessons throughout the day. This student showed a fair amount of understanding of plants on her pre-test but she lacked the vocabulary to explain. As the curriculum progressed, she would attempt to use the vocabulary but only when she had heard it used by other students during that class period. She was often non-responsive unless called on. Her post-test demonstrated that she was absorbing everything going on around her and processing it. She was able to provide accurate reasoning to her answers. Her use of academic vocabulary increased to 40%.

Second advanced/advanced high. This student has been enrolled in the ESL program for three years, since kindergarten. She has experienced interrupted schooling and has moved back and forth between Mexico, Louisiana, and Texas since she began public education. Her mother is a native Spanish speaker but is not a standard language speaker and her father speaks English. This school year has seen tumult in her home life and has spilled over to her academics. She has shown lack of motivation and does not want to be in school throughout the year. She had a very basic understanding of plants, their parts, their importance, and their needs on the pre-test assessment. Her vocabulary was limited to basic terminology and affected her descriptions throughout the assessment. Throughout the unit, her engagement within the classroom became more prominent. She began volunteering answers more frequently. There were still a few days when my co-teacher had to retrieve her from her classroom. These days were typically preceded by a lesson she did not enjoy or pushed her too far out of her comfort zone. She was the only

student to show depreciation in any area of one of the objectives from the pre-test to the post-test. Her understanding of the interdependence between plants and other animals depreciated by 20% from assessment to assessment. Going into the pre-test, this student was able to correctly answer why plants and gardens are important as well as what is oxygen and what is its purpose. However, the post-test results showed that she had changed her understanding of oxygen and that she did not understand the purpose of plants and gardens. In all other areas except photosynthesis, she showed an increase in her understanding of the concepts as well as her usage of academic terminology.

Third beginner. This student has been served in ESL since kindergarten and has also been retained. She is the oldest of two and does not receive much attention at home from her mother does not have time to focus on her children because she is providing care for three other families in the community. This past school year, she was labeled a slow academic learner but did not qualify for special education services. She is very easily distracted and quickly loses focus but is not diagnosed as ADD. She learns best kinesthetically with varied, direct, and frequent motivation. She is an incredibly social student but demonstrates a lack of engagement towards her schooling due to the frustrations she has experienced throughout it. On her pre-assessment, this student was able to complete the lower, more concrete questions and activities but was unable to move beyond that to the higher-order thinking questions. There were several concepts she had no understanding of including the environmental impact on plants and inherited traits. In addition, her vocabulary was limited to words describing parts of plants. During the unit, she demonstrated an eagerness to participate that had not been seen all school year, was one of the students who had to be told not to come up so early, and after several repetitions of a concept or word, was able to successfully use them. Her post-test demonstrated an increase in all

areas except for inherited traits where she still had no understanding of the concept. She increased her science word bank 20% and was able to back up her answers with more details than she did in her pre-assessment.

Third intermediate. This student has been in ESL since he was enrolled in kindergarten. He is the youngest of two with a single, working mother. Both him and his brother go home to an empty house and rarely see their mother for long periods of time. Both siblings are self-motivated and very eager to learn. He was diagnosed as dyslexic earlier this school year and relies on his big brother to both encourage and motivate him. He receives very little adult praise, and craves it. With the exception of inherited traits and photosynthesis, this student had a basic foundational understanding of plants. However, he was unable to provide justification for his answers. They just were. A stem was a stem because it just was but he did not know what the purpose of a stem was. His academic vocabulary was limited to knowledge of plant parts but he had little understanding beyond that. During the four weeks, he absorbed knowledge like a sponge and retained every lesson. He was able to distinctly describe concepts in detailed ways so that a guest to the class would have been able to participate. His post-test illustrated significant improvement in all areas. Most notably was his improvement in academic vocabulary that jumped from 20% to 60% correct usage.

Third advanced/advanced high. This student comes from a Spanish only home and is one of four siblings. He is the only typically developing child in his family as his other three siblings are all enrolled in the special education program or PPCD. He has been in ESL since he was in first grade and has consistently shown his eagerness to learn. Because his other siblings receive special education services and his mother's energies are devoted to the baby who has Downs' Syndrome, this student has been self-motivated and independent very early on because

there is no one in the household to help him in his academic assignments. This student was the most successful of all of the participants. He began the pre-assessment with a very basic foundation of knowledge. His reasoning behind living and nonliving was based on the ability of movement. He guessed on many of the activities and questions and his vocabulary use was minimal. By the post-test, he had mastered every expectation to 100%. His explanations were elaborate and included every facet of a concept taught. No other participant was able to make a perfect score on the post-assessment.

Pre/Post Test

Depending on the grade level, the pre/post-test was designed around certain concepts derived from the TEKS. The participants were tested with the exact same test immediately before conducting the study as well as immediately after. For the living versus nonliving portion, plants versus not a plant, and plant needs, the students sorted various photos into one of the two determining categories for the appropriate activity. As they sorted the photographs, they were asked about their reasoning behind placing that image on one side or another. A puzzle was used to determine if a participant could correctly identify and place each part correctly. The student was also asked five developmentally appropriate multiple-choice question to assess if they knew the correct answer should they hear it. As with the sorting activities, the students were asked to explain what they knew about each part. For the Plant Life Cycle assessment, students were given two different plant life cycles that they were to place in order, describing what was happening, and recognize that every life cycle ends in death. Throughout the assessment, there was a list of ten academic words that the researcher was listening for. Results for both the pre and post-test were based on percentage correct in each activity.

Table 1: Kindergarten Pre/Post-test Data

Student/Language Designation	Objective	Pre-Test (%)	Post-Test (%)
Kindergarten Advanced/ Advanced High	Living v. nonliving	60	100
	Plants v. not a plant	80	80
	Plant needs	80	100
	Plant parts	40	80
	Plant Life Cycle	80	80
	Use of Academic words	20	40
Kindergarten Intermediate	Living v. nonliving	40	100
	Plants v. not a plant	40	80
	Plant needs	40	80
	Plant parts	40	80
	Plant Life Cycle	20	80
	Use of Academic words	0	40
Kindergarten Beginner	Living v. nonliving	80	100
	Plants v. not a plant	40	80
	Plant needs	60	80
	Plant parts	40	60
	Plant Life Cycle	20	40
	Use of Academic words	0	20

The first grade pre and post assessment was similar to the kindergarten in format. There were a few differences within the activities that increased the difficulty of the assessment. The activity assessing the student's ability to determine what is needed by a plant for survival and what is not needed included the addition of oxygen, carbon dioxide, and air. Additionally, the plant part assessment required the students to do an additional multiple-choice question and label a flowering plant verbally. There were thirteen academic terms that the first grade participants were assessed on including oxygen and carbon dioxide. Finally, the students were assessed using three different plant life cycles instead of two as the kindergarteners were. As with the younger pre/post-test assessment, the results were computed into percentages for the sake of comparison.

Table 2: First Grade Pre/Post-test Data

Student/Language Designation	Objective	Pre-Test (%)	Post-Test (%)
First Advanced/ Advanced High	Living v. nonliving	80	100
	Plants v. not a plant	60	80
	Plant needs	80	80
	Plant parts	40	100
	Plant Life Cycle	80	100
	Use of Academic words	20	100
First Intermediate	Living v. nonliving	80	100
	Plants v. not a plant	80	80
	Plant needs	60	80
	Plant parts	20	80
	Plant Life Cycle	80	80
	Use of Academic words	20	40
First Beginner	Living v. nonliving	80	100
	Plants v. not a plant	80	100
	Plant needs	80	80
	Plant parts	40	80
	Plant Life Cycle	80	80
	Use of Academic words	20	80

The second grade assessment further increased in difficulty. Instead of images for the living versus nonliving sort, the students were given words to read and then sort. Plants versus not a plant and plant needs activities were the same as first grade in difficulty. For the activity regarding plant parts, the second grade students answered twenty-one true/false and multiple-choice questions in addition to the puzzle, describing the purpose, and labeling a flowering plant, tree, vegetable and grass. These students were also assessed on their understanding of photosynthesis using a diagram as well as five open response questions. There were seven open response and multiple choice questions that assessed the interdependence of plants and their environment, including how plants need animals and vice versa. In keeping with the idea of increased appropriate difficulty, the researcher listened for a total of eighteen related academic

vocabulary terms including glucose and chlorophyll. As with the other two grade levels, the responses were converted into percentages for ease of comparison.

Table 3: Second Grade Pre/Post-test Data

Student/Language Designation	Objective	Pre-Test (%)	Post-Test (%)
Second Advanced/ Advanced High	Living v. nonliving	80	100
	Plants v. not a plant	60	80
	Plant needs	60	100
	Plant parts	40	100
	Function of Plants	20	80
	Interdependence	60	40
	Photosynthesis	20	40
	Use of Academic words	20	60
Second Intermediate	Living v. nonliving	100	100
	Plants v. not a plant	80	100
	Plant needs	40	100
	Plant parts	80	80
	Function of Plants	40	80
	Interdependence	60	80
	Photosynthesis	20	40
	Use of Academic words	20	40
Second Beginner	Living v. nonliving	60	100
	Plants v. not a plant	80	100
	Plant needs	60	100
	Plant parts	60	80
	Function of Plants	20	80
	Interdependence	0	60
	Photosynthesis	20	80
	Use of Academic words	0	60

The third grade assessment was similar to the second grade assessment. However, instead of evaluating the interdependence of plants with their environments and the function of plants, the third graders were assessed on their understanding of inherited traits and the impact of the environment on plants including the effect of droughts and floods. Whereas second grade was not responsible for plant life cycles according to the TEKS, third grade is and their assessment consisted of three different life cycles with descriptions of each stage. The academic

vocabulary the researcher listened for as well as how the percentages were computed for comparison purposes are similar to that of second grade.

Table 4: Third Grade Pre/Post-test Data

Student/Language Designation	Objective	Pre-Test (%)	Post-Test (%)
Third Advanced/ Advanced High	Living v. nonliving	80	100
	Plants v. not a plant	80	100
	Plant needs	60	100
	Environmental Impact	40	100
	Plant Life Cycle	20	100
	Inherited Traits	0	100
	Photosynthesis	20	100
	Use of Academic words	20	100
Third Intermediate	Living v. nonliving	100	100
	Plants v. not a plant	80	100
	Plant needs	60	100
	Environmental Impact	100	100
	Plant Life Cycle	80	80
	Inherited Traits	0	100
	Photosynthesis	20	60
	Use of Academic words	20	100
Third Beginner	Living v. nonliving	40	100
	Plants v. not a plant	80	80
	Plant needs	40	80
	Environmental Impact	0	100
	Plant Life Cycle	40	80
	Inherited Traits	0	0
	Photosynthesis	20	40
	Use of Academic words	20	60

Use of Words

The increase in the use of vocabulary was interesting to note. Across the entire sample, the students tended towards descriptions of the words instead of actually employing the vocabulary. In many cases, the word they chose to use was incorrect even in their descriptions. For example, a kindergartener called the roots and the stems of a plant sticks. Another one called everything branches. Yet, as the study progressed and the students went through the three

divisions of the curriculum, there was a noticeable change in the words selected to communicate ideas. The participants used words such as "thrive" and "indigenous." Words that they had only heard briefly in passing and words that were not a part of the selected academic lists made it into conversations both during and out of class.

The students were very eager to learn the new words and to use them correctly. There were several reports from the homeroom teachers of the students correcting their peers and supplying them with the correct vocabulary word as the unit continued. As the post academic vocabulary assessment was conducted, it was noticed that several of the participants' definitions became more elaborate. The elaborations were not just to give the appearance of being more knowledgeable but were spot on. One student defined photosynthesis as "it's sunlight, water, and carbon dioxide mixed to make glucose and oxygen." This student had no answer on the pre-assessment for photosynthesis. Another student confidentially declared oxygen was O_2 and carbon dioxide was CO_2. Both of these were only briefly introduced in a book about photosynthesis and were not used in everyday discussions.

Table 5: List of Academic Words

Grade Level	Academic Word	Suggested Definitions
K, 1, 2, 3	Root	stores food; soaks up vitamins and minerals
K, 1, 2, 3	Leaves	makes food (sugar); take in CO_2 and release O_2 into air
K, 1, 2, 3	Stem	supports plant; many thin tubes that carry water, minerals, and food
K, 1, 2, 3	Flower	part of the plant that makes seeds; attracts pollinators
K, 1, 2, 3	Fruit	some plants have fruit; protect and holds seeds; animals eat fruit and help spread seeds
2, 3	Chlorophyll	green pigment found in leaves; helps make food
2, 3	Photosynthesis	process plants use to make food; turns sunlight, chlorophyll, and CO_2 into food (sugar) and O_2
1, 2, 3	Sugar	type of food that plants make in leaves; called glucose
1, 2, 3	Oxygen	type of gas (air) given off during photosynthesis; people and animals need it
1, 2, 3	Carbon Dioxide	type of gas (air) needed by plants for photosynthesis; plants use up CO_2 and produce O_2; people and animals create CO_2 that plants need to live
K, 1, 2, 3	Seed	a packaged little plant with food around it and a covering protecting it (seed coat)
K, 1, 2, 3	Seed Coat	the protective outer layer of a seed
K, 1, 2, 3	Soil	the outer covering of the earth where plants grow
2, 3	Cotyledon	looks like leaves in a seed; first plant part you see what a seedling pokes out of the ground; helps keep the new seedling fed until it can make its own food; sometimes called seed leaves
2, 3	Embryo	baby plant inside of a seed
K, 1, 2, 3	Petal	colorful, pretty part of a flower
K, 1, 2, 3	Pollen	fine, powder-like material you see covering the anthers; bees collect it; pollen makes some people allergic to it; needed by plants if they are going to make seeds

One of the interesting findings of this study was that even younger ELL students were able to understand and use the academic vocabulary words taught to them. The words that were selected were chosen because these words were ones that would appear in the curriculum taught to each grade level. If the word was not in assigned to a certain grade level (mostly appears with kindergarten), it was because that concept was not encompassed by the TEKS.

Summative reports

The most popular theme that was brought up during the summative reports was that of working with friends. Seven of the participants stated that they chose a certain photograph

because they were working with friends at that time. They would then go on to describe what they were learning in that image but their reasoning was socially centered. One participant gave a very detailed description of her friend stating that "This is my really last picture that I like because…um…Clarissa is in it and she's a really good, nice person and she makes me smile and we were opening a green apple." She then went on to describe the purpose of the lesson and that she learned that fruit protected seeds.

Four students chose a photo showing their interaction with earthworms. This lesson was added at the last minute, when after a rainstorm, there were worms all over the ground. Walking out to the garden, the students exhibited fear over the writhing worms on the sidewalk. It was then decided that since worms are an important factor in the success of any garden, there should be a lesson inserted into the curriculum to familiarize the students with them. This was one of the more popular lessons among the students and was talked about for several days afterwards. When the photographs were laid out for the students to choose from, it cued their memories and they all started recalling their favorite moments from the day that lesson was taught. One second grader even recalled details stating that he measured a worm and "it was twelve inches long. It was dirty and I wiped it and took it outside and put it in our plant garden. It went under the ground and made a hole."

The day the students learned about roots was another popular selection occurring four times. On this day the students learned about roots and were then handed a spade, and gloves and then told to dig up a plant with its root intact. They were then set free in the playground to retrieve their root. One second grader stated "there's another picture and it shows that …um, I am trying to cut out a plant from the grass because it was an experiment where we had to do and then finally I got it out and that the part I like because you had to use a shovel and dig it out as

hard as you can." After he stated his reasoning for choosing the photograph, he described how roots hold the plant in the ground and suck up the water to feed the plant.

The plant needs lesson was chosen by three of the participants. In this lesson the students were sent exploring outside with a goal to find non-examples. They needed to find an example of plants that did not receive enough space, water, sunlight, or proper soil. All of these non-examples were located within the school grounds and as each one was found, the students were encouraged to share what they knew about that need, why it was important, and if applicable, what part of the plant benefited most from that particular need. This lead to a discussion on the severe drought from last year and every group found the stand of dead trees that had not received enough water the previous year.

The fruit seed activity was the last photograph that showed up among more than one participant's collection. In this activity, the students were paired-up and given a half of a fruit. Their job was to dig in, count, and describe the seeds found in fruit ranging from cantaloupe, apples, and oranges, to peaches, green beans, and avocados. It was a very messy, hands-on lesson that led to cooperation among the students, especially the students with an abundance of seeds.

The summative reports ranged in the amount of details and accuracy provided. Generally, the younger students (kindergarten and first grade) descriptions were very basic and concrete. They were able to describe what was happening in the picture but were unable to remember what else occurred during that lesson. The older students (second grade and third grade) were able to not only describe what was happening in the photograph but were also able to provide additional details concerning the lesson of the day, the purpose, and what they thought of the lesson. It can be stated that the summative reports were basic, concrete, and less accurate

in the younger grades than the older grades whose reports were more detailed, abstract, and more accurate. It is also interesting to note that the photographs appearing in multiple student summative reports were activities that were all or partially occurring outside in the garden.

Chapter 5

Discussion

Interpretation of Results

Based on the results of the post-tests, outdoor learning matches well with ELLs. It provides a format that utilizes many of the prescribed teaching methods for English language learners, including Total Physical Response (TPR), repetition, and experience to learn vocabulary. The hands-on nature of creating and maintaining an outdoor area naturally lends itself to foster a safe environment where students feel encouraged to practice unfamiliar academic words and expand the unfamiliar science concepts. There was an increase in the retention of concepts and usage of correct academic vocabulary over the four-week duration as reflected by the data. In some cases, the increase was very dramatic while other instances showed to maintain or improve in smaller increments. The students became more articulate and detailed when answering questions or recalling information and developed strong understandings of abstract concepts, including the complex process of photosynthesis.

Within the mix of participants, there were a couple with diagnosis of ADHD/ADD and a few who have struggled with engagement and focus throughout the progression of the school year. These students were observed to focus for longer periods of times, especially when engaged in the science lessons in the outdoor garden. Even when class could not be conducted outside as scheduled, these students remained engaged provided the lesson was conducted in a tactile manner. During the post-test assessment, it was noted that these students who had appeared to not pay attention during some of the lessons, had actually attended closely and were able to provide specific detailed responses for each tested concept.

While it was not formally assessed, I noticed an increase in motivation with several students bemoaning the end of their assigned class time. As the study and experiences continued, the increase of students arriving earlier than scheduled increased to the point where I had to encourage them to stay in the general classroom until the appropriate times whereas earlier in the year, my co-teacher or myself would have to retrieve a student here and there when they "forgot" to come to class and decided to avoid ESL. The conclusion of this unit also coincided with the conclusion of ESL pull-out for the year with a final celebration of the year out in the garden eating many of the vegetables and fruits that had been grown. Within each grade, there was at least one or two students who pleaded to be allowed to come up for the remainder of the year. Many expressed feelings of sadness and wished that they could continue learning and working in the garden.

It is significant that this particular population of students have benefited from this project. For these participants, learning a second language can be very difficult and the difficulty can be compacted when there is no underlying support system at home as a few of them experience. This is not true of all the students but a small subset within the group of participants. Not only are ELLs expected to become fluent speakers, but they must do so within five to seven years while not falling behind peers in content area knowledge. Any strategy or program that contributes significantly to the arsenal of techniques employed by educators to encourage success with ELLs is one that should be embraced and utilized when possible. Not only does an outdoor classroom or garden serve as a vehicle for language acquisition but it also serves as a nontraditional learning setting to engage learners and reenergize them in the tireless pursuits of knowledge. Outdoor classrooms and gardens are starting to see resurgence in the educational

arena. With the increase in ELL students, the public school cannot afford to neglect such a marriage of hands-on, active, engaging science with language acquisition.

Limitations of Study

Reflecting back on the study, there were several limitations that occurred during the duration of the research. Several of these limitations were typical factors affecting every school setting. For a few of the participants, lack of consistent attendance became an issue. Then there were some days where the engagement of one or two students was never hooked. This was reflected in both the daily work as well as the post-test assessment. There was also the ominous time constraints that every educator dreads and wrestles with, both its placement at the end of the year with state mandated testing and with the daily 40 minute block of time for each grade level. Texas spring weather being as fickle as it is and conducting a study where a majority of the curriculum was outside required flexibility added to the limiting factors. This led to less time interacting within the garden then planned for and more time inside a classroom.

Other limitations specific to this particular study included misleading information in the chosen curriculum (AIMS Primarily Plants) that led to faulty labs, the limited botany knowledge of the researcher, and the first group of the day becoming the experimental group. Within the AIMS curriculum, there were several lessons where the object of the lesson was impossible to achieve because of one reason or another. Additionally, my proverbially black thumb was put to the test during this four-week period. Up until this point, I had never had success with raising any plants passed the juvenile stage and yet, I chose a research question that revolves specifically around botany. Additionally, the first class of the day was second grade. Even though I would run through the lesson prior to teaching that day, the experiences with second grade each

morning would help me fine tune the remainder of the day much to the benefit of the other grades but possibly, to the detriment of second grade. Finally, the lack of proper outdoor classroom facilities possibly limited the findings and data. There were several instances where sitting on a picnic blanket to teach and complete assigned tasks without writing surfaces when other grade levels had recess a few yards away impacted and detracted from the purpose of the daily lesson.

Implications

Utilizing outdoor experiences to enhance science curriculum in elementary school settings is an area ripe for new and continued research especially concerning students with second language acquisition. It is a promising field that has experienced a revival in recent years. This particular study would benefit from continuing research using a larger sample size. The results were limited due to the small number of participating students. It would also be beneficial to conduct the study over a longer duration of several months or an academic school year instead of the four-week time frame of this research. How would this affect the academic language acquisition of second language learners? As stated in the limitations, the lack of a proper outdoor classroom possibly hampered the results of this research. Furthermore, how would the language acquisition be effected if there was a proper classroom facility, additional resources instead of the bare minimum, a larger selection of plants, a garden expert or a community mentor involved in the process? Finally, science academic language is a focus that many Title 1 schools zero in on to improve state testing results. Additional research could be conducted with an entire grade level or school population to see if these students would also experience similar results in academic language acquisition.

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Appendices

Appendix A

The TCU Institutional Review Board (IRB) is responsible for protecting the welfare and rights of the individuals who are participants of any research conducted by faculty, staff, or students at TCU. Approval by the IRB must be obtained prior to initiation of a project, whether conducted on-campus or off-campus. While student research is encouraged at both the undergraduate and graduate level, only TCU faculty or staff may serve as Principal Investigator and submit a protocol for review.

Please submit this protocol electronically to Dr. Meena Shah, IRB Chair and Dr. Janis Morey, Director of Sponsored Research. Also submit a consent document, HIPAA form if applicable, Protecting Human Research Participants Training certificates, recruitment materials, and any questionnaires or other documents to be utilized in data collection. A template for the consent document and HIPAA form, instructions on how to complete the consent, and a web link for the Protecting Human Research Participants Training are available on the TCU IRB webpage at www.research.tcu.edu. Submission deadline for protocols is the 15th of the month prior to the IRB Committee meeting.

1. **Date:**
   February 14, 2012
2. **Study Title:**
   Using a schoolyard garden to increase language acquisition and conceptual understanding of science in elementary ELL students
3. **Principal Investigator (must be a TCU faculty or staff):**
   Molly Weinburgh
4. **Department:**
   College of Education
5. **Other Investigators: List all faculty, staff, and students conducting the study including those not affiliated with TCU.**
   Morgan Stewart
6. **Project Period:**
   4 weeks in mid-March to mid-April in 2012
7. **Funding Agency:**
   Not Applicable
8. **Amount Requested From Funding Agency:**
   Not Applicable
9. **Due Date for Funding:**
   Not Applicable
10. **Purpose: Describe the objectives and hypotheses of the study and what you expect to learn or demonstrate:**

This study will examine the effectiveness of using a schoolyard garden to gauge academic language within science in elementary English Language Learners (ELLs). The specific research question is: How effective is the use of a garden on academic language development and

academic science conceptual understanding of ELL students once they have participated in a focused life science unit of study?

I expect to see a positive correlation between hands-on, real-life garden experience and cognitive science understanding of plants as well as greater mastery of academic language.

11. <u>Background:</u> Describe the theory or data supporting the objectives of the study and include a bibliography of key references as applicable.

With the new STEM initiative, science has received a huge push within schools. However, science experiences are limited to laboratory experiments, textbook passages and teacher demonstrations in most typical classrooms. When it is time to learn about life sciences, students experience these topics through textbook passages, controlled plant examples in a Ziploc bag set in a window, and short time-lapse videos. They are receiving a cursory and surface level of knowledge on a topic that is crucial to their daily lives both in and out of the school environment.

Watching the ELL students flounder in life science, which is the most concrete out of all the sciences in elementary schooling, and seeing this vast unused outdoor space that holds so much potential, led Ms. Stewart to her interest in this research. What if someone with a passion for not only science but serving underserved students began adapting and utilizing this outdoor space to teach the life sciences?

Research concerning ELL students and ESL programs is vast but not concentrated to one specific topic. However, there have been countless studies have been conducted to explore academic achievement for ESL learners but studies on the development of English-language proficiency and academic achievement are lacking. ELL children must learn to not only use English correctly but learn to use it in a variety of cultural and situational contexts and for a range of purposes from presenting information to sharing ideas with peers. Understanding and using language is also necessary to do science and construct understandings in science.

ELLs are acquiring basic English skills from vocabulary to grammatical structure at the same time they are expected to learn an additional technical language, the language of science. It is very common for ELL students to struggle under this academic instruction and come to the science classroom unprepared to navigate the factual and expository texts of science. However, once a student is able to successfully navigate the academic science language, including all the routines and structures therein, they are on their way to becoming a master of reading, writing, listening, and speaking like a scientist. Science is not just a matter of understanding the concepts and being able to relate them to others; it is the process of making meaning of the knowledge and vocabulary. Science activities are an invaluable way in which educators can guide students to visualize and experience natural science phenomena that adds to their background and developing concepts. Gardens are living laboratories where students can manipulate materials, visualize the concepts they have only read about, and apply these concepts in a real world situation. When utilized properly, these places within the school grounds promote development and learning that allow students to connect new information into their everyday lives. They encourage cognitive activities that are pertinent to successful science such as observing, questioning, exploring, and interacting with nature. Therefore, how would a garden effect the academic language and cognitive understanding of ELL students?

12. <u>Subject Population:</u> Describe the characteristics of the participant population including the inclusion and exclusion criteria and the number of participants you plan to recruit:

There will be approximately 16 students from kindergarten to third grade (ages five to nine) students who are also enrolled in the ESL program. A random convenience sample will be taken from the students who have returned both their assents and parental/guardian permissions. Students will receive a designation of "Beginner," "Intermediate," or "Advanced/Advanced High" based on the 2012 Texas English Language Proficiency Assessment System. There will be one participant with the designation "beginner," one with " intermediate" and one with "advanced/advanced high" randomly selected from each grade level chosen to participate in the study. Should there not be a designation represented in a grade level, that designation will not be represented for that grade.

13. <u>Recruitment Procedure:</u> Describe your recruitment strategies including how the potential participants will be approached and precautions that will be taken to minimize the possibility of undue influence or coercion. Include copies of the recruitment letters, leaflets, etc. in your submission.

All students within the ELL program at my school will be told about the study and given the opportunity to participate. Through the usual school parent notification methods, I will inform all parents that I am sending information home about the study. A packet with a cover letter, assent forms, and parent permission forms will be given to the parents. Students and parents will be informed that participation or lack of participation in the study will not affect their grade in anyway.

14. <u>Consenting Procedure:</u> Describe the consenting procedure, whether participation is completely voluntary, whether the participants can withdraw at any time without penalty, the procedures for withdrawing, and whether an incentive (describe it) will be offered for participation. If students are used as participants, indicate an alternative in lieu of participation if course credit is provided for participation. If a vulnerable population is recruited, describe the measures that will be taken to obtain surrogate consent (e.g., cognitively impaired participants) or assent from minors and permission from parents of minors.

This study is completely voluntary and students can withdraw at any time by notifying Ms. Morgan Stewart at the school (972.775.5536 x2360), through written communication, or e-mail (morgan_stewart@midlothian-isd.net). There are no incentives associated to the participants through this student. Since this uses the established school curriculum, there will not be an alternative assignment given if a student chooses not to participate in the study. The data from that participant will not be included in the study. Both assent from the minors and permission from the parents of the minors will be sent home on official school letterhead with the TCU emblem in a sealed envelope given to the student privately. Should the form not be returned, a second form will be sent home in the same way as the first. After the second attempt, study participants will only be selected from the pool of received assents and permissions.

15. <u>Study Procedures:</u> Provide a chronological description of the procedures, tests, and interventions that will be implemented during the course of the study. Indicate the number of visits, length of each visit, and the time it would take to undergo the various tests, procedures, and interventions. If blood or tissue is to be collected, indicate exactly how much in simple terms. Flow diagrams may be used to clarify complex projects.

The students will not be asked to do anything that would not otherwise be required as part of the course. Each participating student will be given a pre-assessment prior to the beginning of the unit of study and to ascertain their level of academic conceptual understanding and level of academic language. The four-week unit will begin determining what is living and what is non-living, to what is a plant and what are plants' basic needs, and finally to what are the ecological implications of plants. As the unit progresses, the students will participate in hands-on practice in the outdoor garden where they will be photographed engaging in the curriculum, planting, tending, observing, and interacting with the garden. They will record their thoughts, ideas, answers, observations, and processes in their science journals they have maintained all year. The students will also use hand-held voice recorders to record observations. These activities will be part of their normal ESL pull-out classroom time of 45 minutes daily unless there is a school-wide assembly or special program. Throughout the study, Ms. Stewart will use the information from their journals, assignments, and voice recordings to gauge their progress in both the content and the academic language. At the conclusion of four weeks, the participants will receive the post-assessment (the same one used for pre-assessment) and complete an oral summative report. The oral summative report will consist of three photos of the student's choosing, and interview with Ms. Stewart, and observations recorded.

16. <u>Data Analyses:</u> Describe how you will analyze your data to answer the study question.

Rubrics will be utilized to gather data during the beginning, middle, and end of the research. The rubrics will be used for pre- and post-assessment, summative oral reports, journal entries, grade-specific academic concepts, and language proficiency. Hand-held tape recorders will be used and transcribed to make observations on the understanding of scientific concepts and academic language progress of the participants.

17. <u>Potential Risks and Precautions to Reduce Risk:</u> Indicate any physical, psychological, social, or privacy risk which the subject may incur. <u>Risk(s) must be specified</u>. Also describe what measures have been or will be taken to prevent and minimize each of the risks identified. If any deception is to be used, describe it in detail and the plans for debriefing.

There are minimal risks involved in this study. Some possible psychological risks include difficulty understanding science concepts, embarrassment when sharing knowledge, idea, and within discussions. Students will receive best practices in teaching, such as extended time, models, and individual discussions with teacher, in order to prevent and minimize difficulty understanding content. Safe discussion practices and a comfortable environment have already been established to encourage sharing and decrease embarrassment. These procedures will be maintaining throughout the duration of this study.

Possible physical risks such as splinters from working with the tools and falling on the ground around the garden are possible. These are minor accidents that can typically happen at school on a daily basis. Proper gardening equipment including child-sized gloves and commercial garden tools will be used to decrease the risk of splinters. Should any injuries occur during this study, subject will be taken to school nurse in compliance with school district polices.

18. Procedures to Maintain Confidentiality: Describe how the data will be collected, de-identified, stored, used, and disposed to protect confidentiality. If protected health information is to be re-identified at a later date, describe the procedure for doing so. All signed consents and hard data must be stored for a minimum of 3 years in a locked filing cabinet (and locked room) in the principal investigator's office, lab, or storage closet at TCU. Your professional society may recommend keeping the materials for a longer period of time.

All information will be kept confidential. The participants' names will be replaced with a code and will not show up on any study documents. All data will be kept on the school district's server or locked in Ms. Stewart's personal filing cabinet in her room at the elementary school. All audio recordings will be filed electronically on the district's server under the file extension dedicated to Ms. Stewart. At the end of the study, all hard copy materials relevant to the research study will be handed over to the principal investigator to file at TCU for the minimum storage period.

19. Potential Benefits: Describe the potential benefits of the research to the participants, to others with similar problems, and to society.

Possible benefits may include increase knowledge in life sciences (specifically concerning plants), technology, vocabulary, and English as well as positive attitudes towards science and increased self-esteem.

20. Training for Protecting Human Research Participants: Submit training certificates for all the study investigators. The training link is available on the TCU IRB webpage at www.research.tcu.edu.

21. Check List for the Items That Need to be Submitted: Please combine all the files into one pdf document before submitting the materials electronically to the IRB. To prevent any delay in the approval of your protocol, use the most recent template for the protocol, consent document, and HIPAA form by downloading them from www.research.tcu.edu each time you prepare your materials.

Appendix B

Texas Christian University
Fort Worth, Texas

PARENT'S PERMISSION TO PARTICIPATE IN RESEARCH

Title of Research:
Using a schoolyard garden to increase language acquisition and conceptual understanding of science in elementary ELL students

Funding Agency/Sponsor:
There is no funding agency or sponsor for this research.

Study Investigators:
Molly Weinburgh (faculty)
Morgan Stewart (ESL teacher at Vitovsky Elementary)

What is the purpose of the research?.
This research will investigate the effectiveness of using an outdoor garden to increase Academic vocabulary and cognitive concepts in English Language Learners at J.A. Vitovsky Elementary in Midlothian ISD.

How many children will take part in this study?
Approximately 16 students from Kindergarten to 3rd grade in the ESL program at J.A. Vitovsky Elementary will participate in this study.

What is my and my child's involvement for taking part in this study?
Your child will participate in a 4-week science unit on plants during his or her regular science/social studies class time, do science activities, fill out surveys, complete entries in his or her science journal, and take part in small group discussions. The activities are the same that he or she would usually participate in during this class period. Your child will not be asked to do anything that would not normally be done in class.

For how long is my child expected to be in this study, and how much of my child's time is required?
Your child will participate during his or her normal 40 minute ESL class period five days each week for 4-weeks unless a special program or event is occurring at that assigned class time. If that is the case, your child will attend the program with the entire school and not be expected to miss it for this research.

What are the risks of taking part in this study and how will they be minimized?
There are minimal risks involved in this study. Some of the possible risks include difficulty understanding science concepts and embarrassment when sharing knowledge, ideas, and within discussions. Since this will be conducted outside on the school grounds, there are minimal physical risks, such as splinters from working with the tools and falling on the ground around the garden. These minor accidents are similar to accidents that happen at school on a daily basis.

What are the benefits for taking part in the study?
The benefits may include increased knowledge in life sciences (specifically plants), technology, vocabulary, and English as well as increased positive attitudes towards science and your child's self-confidence.

Will I be compensated for taking part in the study?
No.

What is an alternate procedure(s) that I can choose instead of having my child take part in this study?
None. Your child will still be responsible for all class work and activities conducted during this 4-week period. The instruction is required for all students. If you do not want your child to participate in this study, then your child's work (science journals, surveys, etc.) will not be analyzed as part of the research study.

How will my child's confidentiality be protected?
All information will be kept confidential. Your child's name will be replaced with a code and will not show up on any study documents. All data will be kept on the Midlothian ISD server or locked in Ms. Stewart's personal file cabinet in her room at J.A. Vitovsky.

All audio recordings will be filed electronically on the Midlothian ISD server.

Is my child's participation voluntary?
This research project is voluntary. Your child may choose not to participate. Your child's work and data will not be included.

Can my child stop taking part in this research?
Yes. Your child can decide to stop taking part in this research at any time. Your child will still participate in the lessons and classroom activities but your child's data, information and work will not be included in the final research findings.

What are the procedures for withdrawal?
If you decide to withdraw your child from this study, please notify Ms. Morgan Stewart (972.775.5536 or morgan_stewart@midlothian-isd.net)

Will I be given a copy of the permission document to keep?
Yes

Who should I contact if I have questions regarding the study?
Ms. Stewart (972.775.5536 or morgan_stewart@midlothian-isd.net)
Dr. Weinburgh (817.257.6115 or m.weinburgh@tcu.edu)

Who should I contact if I have concerns regarding my child's rights as a study participant?
Please contact Dr. Molly Weinburgh (817-257-6115), Dr. Jan Lacina (817-257-6786) or Dr. David Jenkins (817-257-6157).

Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely allowed your child to participate in this research, and you understand that you are not giving up any of your legal rights.

Child's Name (please print): _____
Date of birth:_____

Parent's Name (please print): _____

Parent's Signature: _____
Date:_____

Investigator's Signature: _____
Date:_____

Texas Christian University
Fort Worth, Texas

PERMISO DE PADRE DE FAMILIA DE PARTICIPACIÓN EN INVESTIGACIÓN

Título de la investigación:
Usando el jardín del patio de la escuela para aumentar la adquisición del lenguaje y entendimiento de conceptos en ciencias para estudiantes de ingles como sequndo idioma en la escuela primaria.

Agencia Financiadora/Patrocinador:
No hay ninguna agencia financiadora o patrocinador para esta investigación.

Investigadores del estudio:
Dra. Molly Weinburgh (facultad de TCU)
Morgan Stewart (maestra de ESL de la Primaria Vitovsky)

¿Qué es el objetivo de la investigación?.
Esta investigación considerará lo efectivo de un jardín exterior para incrementar el vocabulario académico y los conceptos cognitivos de los Estudiantes del idioma inglés de la Primaria J.A. Vitovsky del ISD de Midlothian.

¿Cuántos alumnos participarán en este estudio?
Aproximadamente 16 alumnos de Kinder a 3er grado del programa ESL de la Escuela Primaria J. A. Vitovsky.

¿Cómo participaremos mi hijo y yo en este estudio?
Su hijo participará en un módulo de ciencias de 4 semanas relativo a las plantas, durante su hora de clase regular de ciencias/estudios sociales, donde realizará actividades científicas, rellenará encuestas, hará anotaciones en su diario de ciencias, y tomará parte en diálogos de grupos pequeños. Las actividades son las mismas en que normalmente participaría durante esta clase. No se le pedirá a su hijo hacer nada que no haría normalmente dentro de la clase.

¿Por cuánto tiempo se espera que participe mi hijo en este estudio, y cuánto de su tiempo se requerirá?
Su hijo participará durante su clase normal de ESL de 40 minutos, cinco días por semana, durante cuatro semanas, a menos que se presente algún programa o evento especial durante esa hora asignada de clase. En ese caso, su hijo asistirá al programa con el resto del alumnado y no tendrá que faltar al programa debido a esta investigación.

¿Cuáles son los riesgos de participar en este estudio y cómo se minimizarán dichos riesgos?
En este estudio el riesgo es mínimo. Algunos de los posibles riesgos incluyen la dificultad para entender los conceptos científicos y vergüenza para expresar el conocimiento, las ideas o en los diálogos. Ya que esto se realizará afuera, en los terrenos escolares, hay riesgos físicos mínimos como de astillas por trabajar con herramients, o caerse al suelo en el jardín. Estos accidentes menores no son nada que no puede pasar en la escuela a diario.

¿Cuáles son los beneficios de tomar parte en el estudio?
Los beneficios podrían incluir un conocimiento incrementado de las ciencias de la vida (en especial, las plantas), la tecnología, el vocabulario y el inglés, así como mejoras en las actitudes hacia las ciencias y el autoconfianza de su hijo.

¿Recibiré alguna compensación por participar en el estudio?
No.

¿Que es(son) un(los) procedimiento(s) alternativo(s) que puedo elegir en lugar de permitir a mi hijo participar en este estudio?
Ninguna. Su hijo todavía será responsable de completar todo el trabajo y las actividades de salón realizadas durante este período de cuatro semanas. La instrucción es necesaria para todos los estudiantes. Si usted no quiere que su hijo participe en este estudio, entonces el trabajo de su hijo (diario de ciencias, encuestas) no va a ser analizado como parte del estudio de investigación.

¿Cómo se protegerá la intimidad de mi hijo?
Toda la información se guardará en confianza. El nombre de su hijo será sustituido por un código y no aparecerá en ningún documento del estudio. Todos los datos permanecerán en el servidor del ISD de Midlothian o estarán bajo llave en el archivero personal de la Srta. Stewart en su salón de J.A. Vitovsky.

Cualquier grabación en audio se archivará electrónicamente en el servidor del ISD de Midlothian.

¿Es voluntaria la participación de mi hijo?
Este proyecto de investigación es de carácter voluntario. Su hijo puede elegir no participar. No se incluirá el trabajo y los datos de su hijo.

¿Puede mi hijo dejar de participar en esta investigación?
Si. Su hijo puede dejar de participar en esta investigación en cualquier momento. Todavía participará en las lecciones y actividades de salón pero no se incluirá en los hallazgos finales de la investigación ningún dato, información o trabajo de su hijo.

¿Cuáles son los procedimientos para retirarse?
Si decide retirar a su hijo de este estudio, favor de informar a la Srta. Morgan Stewart (972.775.5536 o morgan_stewart@midlothian-isd.net)

¿Se me entregará una copia del documento de permiso?

Si.

¿Con quién me debo comunicar si tengo preguntas acerca de la investigación?
Srta. Morgan Stewart (972.775.5535 o morgan_stewart@midlothian-isd.net)
Dra. Molly Weinburgh (817.257.6115 o m.weinburgh@tcu.edu)

¿Con quién me debo comunicar si tengo dudas acerca de los derechos de mi hijo como participante del estudio?
Por favor, póngase en contacto con la Dra. Molly Weinburgh (817-257-6115), la Dra. Jan Lacina (817-257-6786) o el Dr. David Jenkins (817-257-6157).

Con su firma abajo usted confirma que ha leído o se le ha leído la información proporcionada anteriormente, ha recibido respuestas a todas sus preguntas y se le ha indicado a quién debería llamar si tiene alguna pregunta adicional, que libremente permite a su hijo participar en esta investigación, y que entiende que no está renunciando a ninguno de sus derechos legales.

Nombre del alumno (en letra de molde): _____ F. de nacimiento:_____

Nombre del padre de familia (en letra de molde):
_____

Firma del padre de familia: _____
Fecha:_____

Firma del investigador: _____
Fecha:_____

Appendix C

Kindergarten General Language Rubric

	Beginning	Intermediate	Advanced	Advanced High
Listening	☐ Sort pictures or objects according to oral instructions ☐ Match pictures, objects or movements to oral descriptions ☐ Follow 1 step oral directions ☐ Respond with gestures to songs, chants, or stories modeled by teachers	☐ Follow 2 step oral directions, 1 step at a time ☐ Draw pictures in response to oral instructions ☐ Respond non-verbally to confirm or deny facts ☐ Act out songs and stories using gestures	☐ Find pictures that match oral descriptions ☐ Follow oral directions and compare with visual or nonverbal models ☐ Distinguish between what happens first and next in oral activities or readings ☐ Role play in response to stories read aloud	☐ Order pictures of events accordin to sequential language ☐ Arrange objects or pictures according to descriptive oral discour ☐ Identify pictures associate with academic concepts from oral descriptions
Speaking	☐ Relate some facts from illustrated stories ☐ Describe pictures, classroom objects using simple phrases ☐ Answer questions with one or two words ☐ Complete phrases in rhymes, songs, and chants	☐ Retell stories through pictures ☐ Repeat sentences from rhymes ☐ Make predictions ☐ Answer explicit questions from stories read aloud	☐ Retell narrative stories through pictures with emerging detail ☐ Sing repetitive songs independently ☐ Compare attributes of real objects ☐ Indicate spatial relations of real-life objects using phrases or short sentences	☐ Tell original stories with emergin detail ☐ Explain situations ☐ Offer personal opinions ☐ Express likes, dislikes with reaso
Reading	☐ Match labeled pictures to those in illustrated scenes ☐ Demonstrate concept of print ☐ Distinguish between same and different forms of print	☐ Use pictures to identify words ☐ Classify visuals according to labels or icons ☐ Demonstrate concepts of print ☐ Sort labeled pictures by attribute	☐ Identify some high-frequency words in context ☐ Order a series of labeled pictures and describe orally ☐ Match pictures to phrases/short sentences ☐ Classify labeled pictures by two attributes	☐ Find academic related vocabulary items ☐ Differentiate between letters, words, and sentences ☐ String words together to make sh sentences
Writing	☐ Connect oral language to print ☐ Reproduce letters, symbols, and numbers from models ☐ Copy icons of familiar environmental print ☐ Draw objects from models and label with letters	☐ Communicate using letters, symbols, and numbers in context ☐ Make illustrated "notes" with distinct letter combinations ☐ Make connections between speech and writing ☐ Reproduce familiar words from labeled models or illustrations	☐ Produce symbols and strings of letters associated with pictures ☐ Draw pictures and use words to tell a story ☐ Label familiar objects from models ☐ Produce familiar words/phrases from environmental print and illustrated text	☐ Create content-based representations through pictures and words ☐ Make "story books" with drawing and words ☐ Produce words/phrases independently ☐ Relate experiences using phrases/short sentences

Adapted from: Teachers of English to Speakers of Other Languages (2006). *Prek-12 English Language Proficiency Standards.* Alexandria, VA: Author

First Grade General Language Rubric

	Beginning	Intermediate	Advanced	Advanced High
Listening	☐ Match oral reading of stories to illustrations ☐ Carry out 2 or 3 step oral commands ☐ Sequence a series of oral statements using real objects or pictures ☐ Locate objects described orally	☐ Follow modeled multi-step oral directions ☐ Sequence pictures of stores read aloud ☐ Match objects with functions based on oral descriptions ☐ Classify objects according to descriptive oral statements	☐ Compare/contrast objects according to physical attributes based on oral information ☐ Find details in illustrated, narrative, or expository text read aloud ☐ Identify illustrated activities form oral descriptions ☐ Locate objects, figures, places based on visuals and detailed oral descriptions	☐ Use context clues to gain meanin from grade-level text read orally ☐ Apply ideas from oral discussion to new situations ☐ Interpret information from oral reading of narrative or expository te ☐ Identify ideas/concepts expressed with grade-level content-specific language
Speaking	☐ Use first language to fill in gaps in oral English ☐ Repeat facts or statements ☐ Describe what plants do from photos ☐ Compare real-life objects	☐ Ask questions of a social nature ☐ Express feelings ☐ Retell simple stories form picture cues ☐ Sort and explain grouping of objects ☐ Make predications or hypotheses ☐ Distinguish features of content-based phenomena	☐ Ask questions for social and academic purposes ☐Participate in class discussions on familiar social and academic topics ☐ Retell stories with details ☐ Sequence stories with transitions	☐ Use academic vocabulary in class discussions ☐ Express and support ideas with examples ☐ Give oral presentations on conten based topics approaching grade leve ☐ Initiate conversation with peers a teachers
Reading	☐ Search for pictures associated with word patterns ☐ Identify and interpret pre-taught labeled diagrams ☐ Match voice to print by points to icons, letters, or illustrated words ☐Sort words into word families	☐ Make text-to-self connections with prompting ☐ Select titles to match a series of pictures ☐ Sort illustrated content words into categories ☐ Match phrases and sentences to pictures	☐ Put words in order to form sentences ☐ Identify basic elements of fictional stories ☐ Follow sentence-level directions ☐ Distinguish between general and specific language in context	☐ Begin using features of non-fictic text to aid comprehension ☐ Use learning strategies ☐ Identify main ideas ☐ Match figurative language to illustrations
Writing	☐ Provide information using graphic organizers ☐ Generate lists of words/phrases from banks or walls ☐ Complete modeled sentence starters ☐Describe people, places, or objects from illustrated examples and models	☐ Engage in prewriting strategies ☐ Form simple sentences using word/phrase banks ☐ Participate in interactive journal writing ☐ Give content-based information using visuals or graphics	☐ Produce original sentences ☐Create messages for social purposes ☐ Compose journal entries about personal experiences ☐Use classroom resources	☐ Create a related series of sentenc in response to prompts ☐ Produce content-related sentence ☐ Compose stories ☐ Explain processes or procedures using connected sentences

Adapted from : Teachers of English to Speakers of Other Languages (2006). *Prek-12 English Language Proficiency Standards.* Alexandria, VA: Author.

Second Grade General Language Rubric

	Beginning	Intermediate	Advanced	Advanced High
Listening	☐ Match oral reading of stories to illustrations ☐ Carry out 2 or 3 step oral commands ☐ Sequence a series of oral statements using real objects or pictures ☐ Locate objects described orally	☐ Follow modeled multi-step oral directions ☐ Sequence pictures of stores read aloud ☐ Match objects with functions based on oral descriptions ☐ Classify objects according to descriptive oral statements	☐ Compare/contrast objects according to physical attributes based on oral information ☐ Find details in illustrated, narrative, or expository text read aloud ☐ Identify illustrated activities form oral descriptions ☐ Locate objects, figures, places based on visuals and detailed oral descriptions	☐ Use context clues to gain meanin from grade-level text read orally ☐ Apply ideas from oral discussion to new situations ☐ Interpret information from oral reading of narrative or expository te ☐ Identify ideas/concepts expressed with grade-level content-specific language
Speaking	☐ Use first language to fill in gaps in oral English ☐ Repeat facts or statements ☐ Describe what plants do from photos ☐ Compare real-life objects	☐ Ask questions of a social nature ☐ Express feelings ☐ Retell simple stories form picture cues ☐ Sort and explain grouping of objects ☐ Make predications or hypotheses ☐ Distinguish features of content-based phenomena	☐ Ask questions for social and academic purposes ☐ Participate in class discussions on familiar social and academic topics ☐ Retell stories with details ☐ Sequence stories with transitions	☐ Use academic vocabulary in class discussions ☐ Express and support ideas with examples ☐ Give oral presentations on conten based topics approaching grade leve ☐ Initiate conversation with peers a teachers
Reading	☐ Search for pictures associated with word patterns ☐ Identify and interpret pre-taught labeled diagrams ☐ Match voice to print by points to icons, letters, or illustrated words ☐ Sort words into word families	☐ Make text-to-self connections with prompting ☐ Select titles to match a series of pictures ☐ Sort illustrated content words into categories ☐ Match phrases and sentences to pictures	☐ Put words in order to form sentences ☐ Identify basic elements of fictional stories ☐ Follow sentence-level directions ☐ Distinguish between general and specific language in context	☐ Begin using features of non-fictic text to aid comprehension ☐ Use learning strategies ☐ Identify main ideas ☐ Match figurative language to illustrations
Writing	☐ Provide information using graphic organizers ☐ Generate lists of words/phrases from banks or walls ☐ Complete modeled sentence starters ☐ Describe people, places, or objects from illustrated examples and models	☐ Engage in prewriting strategies ☐ Form simple sentences using word/phrase banks ☐ Participate in interactive journal writing ☐ Give content-based information using visuals or graphics	☐ Produce original sentences ☐ Create messages for social purposes ☐ Compose journal entries about personal experiences ☐ Use classroom resources	☐ Create a related series of sentenc in response to prompts ☐ Produce content-related sentence ☐ Compose stories ☐ Explain processes or procedures using connected sentences

Adapted from : Teachers of English to Speakers of Other Languages (2006). *Prek-12 English Language Proficiency Standards.* Alexandria, VA: Author.

Third Grade General Language Rubric

	Beginning	Intermediate	Advanced	Advanced High
Listening	☐ Categorize content-based pictures from oral descriptions ☐ Arrange pictures or objects per oral information ☐ Follow 2 step oral directions ☐ Draw in response to oral descriptions ☐ Evaluate oral information	☐ Follow multi-step oral directions ☐ Identify illustrated main ideas from paragraph-level oral discourse ☐ Match literal meanings of oral descriptions or oral reading to illustrations ☐ Sequence pictures from oral stories, processes, or procedures	☐ Interpret oral information and apply to new situations ☐ Identify illustrated main ideas and supporting details from oral discourse ☐ Infer from and act on oral information ☐ Role play the work of authors, scientists, historians from oral readings, videos, or multi-media	☐ Carry out oral instructions containing grade-level content-based language ☐ Construct models or use manipulative to problem-solve based on oral discourse ☐ Distinguish between literal and figurative language in oral discourse ☐ Form opinions of please, places, ideas from oral scenarios
Speaking	☐ Ask simple, everyday questions ☐ Restate content-based facts ☐ Describe pictures, events, objects, or people using phrases or short sentences ☐ Share basic social information with peers	☐ Answer simple content-based questions ☐ Re/tell short stories or events ☐ Make predictions or hypotheses from discourse ☐ Offer solutions to social conflict ☐ Present content-based information	☐ Answer opinion questions with supporting details ☐ Discuss stories, issues, and concepts ☐ Give content-based oral reports ☐ Offer creative solutions to issues/problems ☐ Compare/contrast content-based functions and relationships	☐ Justify/defend opinions or explanations with evidence ☐ Give content-based presentations using technical vocabulary ☐ Sequence steps in grade-level problem-solving ☐ Explain in detail results of inquir
Reading	☐ Identify facts and explicit messages from illustrated text ☐ Find changes to root words in context ☐ Identify elements of story grammar ☐ Follow visually supported written directions	☐ Interpret information or data form charts and graphs ☐ Identify main ideas and some details ☐ Sequence events in stories or content-based processes ☐ Use context clues and illustrations to determine meaning of words/phrases	☐ Classify features of various genres of text ☐ Match graphic organizers to different texts ☐ Find details that support main ideas ☐ Differentiate between fact and opinion in narrative and expository text	☐ Summarize information from multiple related sources ☐ Answer analytical questions abou grade-level text Identify, explain, and give examples figures of speech ☐ Draw conclusions from explicit a implicit text at or near grade level
Writing	☐ Make lists from labels or with peers ☐ Complete/produce sentences from word/phase banks or walls ☐ Fill in graphic organizers, charts and tables ☐ Make comparisons using real-life or visually-supported materials	☐ Produce simple expository or narrative text ☐ String related sentences together ☐ Compare/contrast content-based information ☐ Describe events, people, processes, procedures	☐ Take notes using graphic organizers ☐ Summarize content-based information ☐ Author multiple forms of writing from models ☐ Explain strategies or use of information in solving problems	☐ Produce extended responses of original text approaching grade level ☐ Apply content-based information new contexts ☐ Connect or integrate personal experiences with literature/content ☐ Create grade-level stories or repo

Adapted from : Teachers of English to Speakers of Other Languages (2006). *Prek-12 English Language Proficiency Standards.* Alexandria, VA: Author.

Kindergarten Academic Content Rubric

Percentage of time correct response given	0%	20%	40%	60%	80%	100%
Student can correctly identify living organisms vs. non-living objects						
Student can identify which organisms are plants and which are not plants from a set of images and words						
Student can identify the basic needs of plants in order to survive						
Student can identify parts of plants by manipulating puzzle pieces and labels						
Student can manipulate labels to correctly sequence stages of typical plant life cycle						
Student uses academic vocabulary in descriptions and interactions with researcher						

Adapted from Kindergarten TEKS

Observation Notes:

First Grade Academic Content Rubric

Percentage of time correct response given	0%	20%	40%	60%	80%	100%
Student can correctly identify living organisms vs. non-living objects						
Student can identify which organisms are plants and which are not plants from a set of images and words						
Student can identify the basic needs of plants in order to survive						
Student can identify parts of plants from a word bank						
Student can manipulate labels to correctly sequence stages of typical plant life cycle						
Student can explain ways that young plants resemble their parent plants						
Student uses academic vocabulary in descriptions and interactions with researcher						

Adapted from First TEKS

Observation Notes:

Second Grade Academic Content Rubric

Percentage of time correct response given	0%	20%	40%	60%	80%	100%
Student can correctly identify living organisms vs. non-living objects						
Student can identify which organisms are plants and which are not plants from a set of images and words						
Student can identify the basic needs of plants in order to survive						
Student can identify parts of plants from a word bank						
Student can describe the function of the physical characteristics of plants to help them meet their basic needs						
Students can compare and give examples of the ways plants depend on their environments with in a garden						
Student can explain and describe the process of photosynthesis including all the necessary components for it to occur						
Student uses academic vocabulary in descriptions and interactions with researcher						

Observation Notes:

Third Grade Academic Content Rubric

Percentage of time correct response given	0%	20%	40%	60%	80%	100%
Student can correctly identify living organisms vs. non-living objects						
Student can identify which organisms are plants and which are not plants from a set of images and words						
Student can identify and describe the function of the physical characteristics of plants to help them meet their basic needs						
Student can describe how environmental changes such as floods and droughts effect plants						
Student can identify, describe, and compare how a plant undergoes a series of orderly changes in its diverse life cycle						
Student can explain and describe how some characteristics of plants are inherited such as flower color in response to living in a certain environment						
Student can explain and describe the process of photosynthesis including all the necessary components for it to occur						
Student uses academic vocabulary in descriptions and interactions with researcher						

Adapted from Third Grade TEKS

Observation Notes:

Kindergarten Summative Oral Report Rubric

	1 Responds with no connection	2	3	4	5 Correctly responds
Student correctly sequences self-chosen photos					
Student orally explains events depicted in photo with clarity					
Student justifies reasoning behind photo choices					
Student explains, using correct academic language, what is occurring within photos					
Student explains academic concept with a firm understanding (no misconceptions)					

Notes:

First Grade Summative Oral Report Rubric

	1 Responds with no connection	2	3	4	5 Correctly responds
Student correctly sequences self-chosen photos					
Student orally explains events depicted in photo with clarity					
Student justifies reasoning behind photo choices					
Student explains, using correct academic language, what is occurring within photos					
Student explains academic concept with a firm understanding (no misconceptions)					

Notes:

Second Grade Summative Oral Report Rubric

	1 Responds with no connection	2	3	4	5 Correctly responds
Student correctly sequences self-chosen photos					
Student orally explains events depicted in photo with clarity					
Student justifies reasoning behind photo choices					
Student explains, using correct academic language, what is occurring within photos					
Student explains academic concept with a firm understanding (no misconceptions)					

Notes:

Third Grade Summative Oral Report Rubric

	1 Responds with no connection	2	3	4	5 Correctly responds
Student correctly sequences self-chosen photos					
Student orally explains events depicted in photo with clarity					
Student justifies reasoning behind photo choices					
Student explains, using correct academic language, what is occurring within photos					
Student explains academic concept with a firm understanding (no misconceptions)					

Notes:

VITA

Personal Background	Morgan Stewart Mansfield, Texas Daughter of Stephen Stewart and Debora Kyler
Education	Diploma, Mansfield High School, Mansfield, Texas, 2002 Bachelor of Arts, Southwestern University, Georgetown, Texas, 2002 Master of Science Education, Environmental Studies, Texas Christian University, Fort Worth, Texas, 2012
Experience	Third grade classroom teacher, NISD, San Antonio, Texas, 2006-2008 K-5 ESL teacher, MISD, Midlothian, Texas, 2009-present
Professional Memberships	Association of Texas Professional Educators

ABSTRACT

USING A SCHOOLYARD GARDEN TO INCREASE LANGUAGE ACQUISITION AND CONCEPTUAL UNDERSTANDING OF SCIENCE IN ELEMENTARY ELL STUDENTS

by Morgan Stewart, M.Ed., 2012
College of Education
Texas Christian University

Thesis Advisor: Molly Weinburgh, Professor of Education and Director of Andrews Institute of Mathematics and Science Education

Cecilia Silva, Professor of Education

This action research study examined a small cross-section of a Texas public school population. Participants were kindergarten through third grade students enrolled in the English as a Second Language (ESL) Program who were pulled out of their general classroom to receive English support within the content area of science. This study looked at how effective a hands-on learning experience using a schoolyard garden enhanced the academic language and science content of the participants. The study began in mid-March and concluded at the end of April with each group receiving 40 minutes of instruction five days a week. Each group consisted of a Beginner, Intermediate, and Advanced/Advanced High student for a total of 12 participants. Four forms of data were used in this study: archival, pre-test, post-test, and journal. Rubrics were used to analyze individual students' level of academic language before and after the study. The results illustrate that the younger students (kindergarten and first grade) descriptions were very basic and concrete while the older students had more accurate and descriptive responses. Upon completion of this research, it was determined that the usage of a schoolyard garden compliments both the acquisition of academic language and the increase in science content knowledge.