THE IMPACT OF A PROJECT-BASED LEARNING COMPREHENSIVE SCHOOL REFORM ON STUDENT ACHIEVEMENT IN A GROUP OF HIGH-POPULATION BILINGUAL URBAN CAMPUSES

A Dissertation

by

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ABSTRACT

A study was conducted utilizing a mixed ANOVA design for descriptive and comparative analysis to investigate a project-based learning intervention in five bilingual campuses. Prior to this intervention, there was no implementation of school reform that was specifically designed for English language learners (ELLs). This intervention was conducted for 4 years during a Title VII comprehensive school reform grant to determine any relationship between the intervention and student achievement in reading, math, and language in both English and Spanish. There were five campuses in the treatment group and four campuses in the district comparison group. The treatment group received instruction in project-based learning in English and Spanish, and both groups followed the district curriculum guidelines as to the Spanish/English allotment.

There was a cohort of 225 students in Grades 1, 2, and 3 in Spanish reading instruction and a cohort of 23 students in Grades 4 and 5 in English reading instruction. Both cohorts were tested in the language of instruction on a yearly basis. Spanish academic performance was measured with the Aprenda, while English academic performance was measured with the Stanford 9 and 10. Normal Curve Equivalency scores (NCEs) were collected to determine the effect of treatment and time. English language proficiency was measured with the Reading Proficiency Test in English (RPTE) using whole-school growth with treatment, district comparison, and state comparison percentages of growth.

The treatment group had higher mean scores than the comparison schools at the beginning of the intervention, but both groups declined in performance. There was a strong indicator that the treatment campuses experienced an "implementation dip" as a result of this curricular innovation. Changes in administration affected both groups. Variables such as mobility rate, student-to-teacher ratio, and district/state level changes were also discussed. There was no statistically significant impact of treatment on Hispanic ELL students as a result of the 4-year Techno-learning project.

DEDICATION

My father went back to school in his 60s. He did not have the opportunity to finish high school, so he returned to school to educate himself.

Jimmie was a child of the Great Depression and had to deliver groceries and prescriptions for Mr. Schuler at the corner drugstore to help put food on the table. Then he entered World War II before he completed high school. When he returned from the war, he married my mother and earned his living as a switchman on the Frisco railroad.

He always had ambition. Later he started a small business after working 4 to midnight on the railroad. He would wake up and start delivering top soil, rock, and sand. He started with one truck, then two. He bought heavy equipment and later was landscaping around commercial buildings, even the Kansas City Athletics baseball stadium and the Hallmark Center.

That was not enough. He started buying property, farm land, and speculating about property that could be commercially developed. Upon his death, he had several parcels of land, one which sold to make way for a cloverleaf. He loved to own land. We would go out in his old blue pick up truck and look at his properties.

He would tell me, "When you are not sure, you need to sit back and re-evaluate your life." He never quit anything that he started to do. He inspired me to continue my education. I can now say that I have finished this phase of my life. He always valued education, and I dedicate this to him.

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CHAPTER I

INTRODUCTION

Federal funding has supported initiatives to target low-performing subgroups in schools, usually resulting in specialized pullout programs that provided remedial services in Title I schools since the mid-1960s. Title I funding was based on the percentage of students receiving free and reduced lunches on a campus. The results of these programs were marginal; thus, at the time of the 1994 re-authorization of Title I states were called upon to make significant changes. States needed to raise standards, build teacher capacity, develop challenging assessments, guarantee participation of all students, and create systemic reforms. The effective schools research (Edmunds, 1979) and the concept of systemic change inspired the emerging vision of reform, more than specific groundbreaking empirical studies (Borman, Stringfield, & Slavin, 2001).

The first Secretary's Commission on Necessary Skills (SCANS) report described three critical areas of development that needed to be cultivated in American classrooms: basic skills, thinking skills, and personal qualities. Students also needed five basic competencies to succeed: productive use of resources, interpersonal skills, information processing skills, ability to understand complex inter-relationships, and ability to work with a variety of technologies (SCANS, 1991a).

President Bush recognized the gap between student achievement and the goals as described in the SCANS report. He turned to the private sector, to business leaders to establish a private, non-profit corporation to provide funding for design teams to create

innovative designs in grades K-12. The New American Schools (NAS) began its initiative to assist schools in whole-school reform efforts in 1991. They recognized that that the partial or targeted approach to school reform had not been effective (Berends, Bodilly, & Kirby, 2002). This NAS Corporation, also known as New American Schools Development Corporation (NASDC), had as its ultimate purpose to improve student performance throughout the United States by developing effective designs and assisting schools in implementation of these designs. Policy changes spurned this systemic reform movement, and later the parallel development of the Request for Proposal (RFP) for the Title VII Comprehensive School Grants opened in 1999.

These grants focused on programs specifically for immigrant/bilingual/English as second language (ESL) students. Title VII, Part A, provided funding for projects to assist local school districts and higher education as well as community-based organizations. They were intended specifically to develop and enhance an institution's capability to make available high-quality instruction, through bilingual education or special alternative instructional programs, to children and youth of limited English proficiency and to develop English proficiency so those students would comply with the same State subject-area standards as all children (H. R. Res. 6, 1994). These comprehensive school grants were awarded to implement school-wide bilingual education programs or alternative instructional programs for changing or improving programs and infrastructure within an individual school that served high concentrations of English language learners (Fed. Reg: Volume 64, 1999).

The Title VII Comprehensive School grants were a response to the need for language minority groups to reach the same academic standards as other students. In 1997-98, the number of ELLs in U.S. schools was estimated at 3.4 million, a number which had doubled over the previous 10 years (Land & Legters, 2002). Thomas & Collier (2002) predicted that the English language learner (ELL) student population is anticipated to reach 40% of all students entering public schools by the 2030s.

The previous efforts at school improvement did not address the needs of ELLs in public schools. Researchers (Hamann, Zuliani, & Hudak, 2002, 2004) investigated the state departments of education in the northeastern region to see if the reform projects submitted aligned with the needs of ELLs. The original comprehensive demonstration projects were not designed for English language learners. State leaders did not account for the tremendous percentage of ELLs in the original state formulation and submission of Comprehensive School Reform Demonstration Program CSRD state initiatives (Hamann, Zuliani, & Hudak, 2002, 2004). Many ELLs were receiving pull-out treatments for English language instruction, which have been documented as the least effective program method for language acquisition (Thomas & Collier, 2002). The Title I re-authorization in 1994 had already urged the use of school-wide systemic reform models, but the specific cultural and linguistic aspects of ELLs were not addressed. The Title VII Comprehensive grants finally addressed the needs of ELLs in high-population settings with a school-wide reform model. This model would involve restructuring of curriculum goals and school-wide initiatives.

In this study the project-based learning (PBL) reform model, Techno-learning, was examined to determine if there was an impact on the second-language acquisition and student achievement of Hispanic elementary English language learners.

Rationale

Researchers in various disciplines have found project-based learning fosters higher-order thinking skills and cultivates learner autonomy (Au & Carroll, 1997; Barrows, 1996; Blumenfeld, Fishman, Krajcik, Marx, & Soloway, 2000; Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palinscar, 1991). This approach has been productive also when integrated with computer technology (Edelson, Gordin, & Pea, 1999; Schwartz, 1998; Stites, 1998).

Based on recent theories in the field of Second Language Acquisition (SLA), project-based learning and second language acquisition have some commonalities. Three major themes in the field of SLA today are: new conceptions of language and language learning supported by constructivist learning theory; need for ELLs to develop digital literacy, and need for higher-order thinking skills (SCANS, 1991b; Shetzer & Warschauer, 2000). PBL is constructivist in nature, uses technology to inspire further learning, and fosters higher-order thinking skills through use of the inquiry method. Yet few existing studies of project-based learning in language development (Eying, 1989; Sidman-Taveau, 2005) point to possible second language issues. Furthermore, there are more studies directed to second language acquisition at the middle and high school levels (Duncan & Tseng, 2010; Krajcik, Blumenfeld, Marx, Bass, Fredericks, & Soloway, 1998; Mergendoller & Maxwell, 2006) than in the elementary setting where

the foundational structure of language learning is built. There is a body of research on various types of systemic reform and comprehensive school reform projects. Burkart and Kauffman (2001) report on a 5-year, federally funded study to investigate reforms on campuses previously rewarded awarded Title VII Comprehensive school grants. The nine English language acquisition schools in the study have several different program configurations, i.e., two-way immersion, transitional bilingual education, sheltered instruction, and ESL. None of the 21 schools in the study employed a project-based curriculum. There is a need for empirical research that specifically examines the results of an intervention which focuses on school-wide reform in highly populated elementary bilingual campuses where Spanish and English language development and academic proficiency are the focus (Hamann et al., 2002; 2004; Menken, 2000). Studies of elementary grade students have been small in scale and based on a case study design (Bradburn, 2007; Datnow, Borman, Stringfield, Overman, & Castellano, 2003).

In January 2000, the treatment and control groups in this study were from the largest school district in the state, seventh largest in the United States. There were 217,000 students in 288 schools and programs, and 56% students in the proposed sub-district were limited English proficient (LEP). The community was 92% Hispanic. The sub-district had 25 schools encompassing 20 elementary, 3 middle schools, and 2 high schools. The ethnicity analysis included: 92% Hispanic, 5% Anglo, 3% African American, and 1% other nationalities.

The five campuses participating in the project for the entire evaluation period represented 2,191 students with 55% LEP. Through analysis shown in Table 1 of the

baseline archival data provided, it was clear that there were a number of LEP students at four of the original five schools in the proposed sample. This high concentration of LEP students provided a large sample of language minority students to study the impact of school-wide comprehensive reform on language learning and student achievement.

Table 1: LEP Students in Treatment Group (TG) Sample*

TG School	Enrollment	#LEP	%LEP
TG1	610	363	59. 5
TG2	380	252	66. 3
TG3	359	161	44. 9
TG4	422	264	62. 6
TG5	420	209	49. 8
Total	**2,191**	**1,249**	

*Information retrieved from Academic Excellence Indicator System Reports (AEIS), Texas Education Agency

Purpose of Study and Research Questions

The primary goal of this study was to determine if there was any change in student academic achievement and literacy development in the participating campuses with the project-based learning intervention from 2001-2005 in the comprehensive school-wide reform project. Three research questions guided this study:

- Research Question 1: What is the impact of 4-year whole-school reform on Hispanic ELL students' academic achievement in reading in English, math in English, and English language arts by grade level?
- Research Question 2: What is the impact of 4-year whole-school reform on Hispanic ELL students' academic achievement in reading in Spanish, math in Spanish, and Spanish language arts by grade level?
- Research Question 3: How did a 4-year whole-school reform impact school-level English proficiency among ELL students?

Delimitations and Limitations of the Study

One delimitation was the sample population. This study focused on five elementary bilingual campuses with a high concentration of LEP students in a large urban district. The limitation of the study involved the purposive sampling of the students. Data were derived from only one sub-district in a large urban district in the southwest United States. The purposive sampling limited potential impact of the study's findings beyond the district studied to other similar demographic, geographic populations. Therefore, this may decrease generalizability of the study.

Definition of Terms

At-Risk

An at-risk student is one who "is identified as at risk of dropping out of school based on state-defined criteria" (TEC 29.081). At-risk status is obtained from state data records from the Public Education Information Management System (PEIMS). This

statutory criteria includes students of limited English proficiency as defined by TEC 29.052 as well as any student in pre-kindergarten, kindergarten, or Grades 1, 2, or 3 who did not perform satisfactorily based on a range of acceptability on a previously determined assessment instrument administered during the current school term. Definition retrieved from http://www. tea.state.tx. Us/perfreport/aeis/2005/glossary.pdf.

Basic Interpersonal Communication Skills (BICS)

BICS is one of the two general categories of language proficiency proposed by Cummins (1979, 1981a, 1981b). Learners who have reached the BICS phase have acquired one or more of the following: "accent, oral fluency and sociolinguistic competence" (Larsen-Freeman & Long, 1991, p. 39).

Cognitive Academic Language Proficiency (CALP)

CALP is one of the two levels of language proficiency proposed by Cummins (1979, 1981a, 1981b). Learners who have acquired CALP are able to comprehend and produce abstract, academic language (Larsen-Freeman & Long, 1991, p. 39). CALP takes longer than BICS to acquire. Generally the time required to develop CALP is 7 to 10 years of language exposure and instruction.

Comprehensive School Grants

Under Section 7114 of Title VII, RFP, January 2000, schools could receive financial assistance for reforming, restructuring, and improving whole-school programs

in an individual school with high concentrations of LEP students which served all children of limited English proficiency.

Comprehensive School Reform Model

An external organization develops a framework for teaching and learning to improve the entire school. The model developers arrange school structure, classroom practices, and school culture based on the vision of education. The external organization may provide materials, professional development, and onsite technical assistance to faculty and staff across a period of time.

Implementation Dip

Many schools in the reform process experience a literal dip in performance and confidence as participants encounter an innovation that requires new skills and concepts (Fullan, 2001). Educational leaders are involved in transforming the culture of the school within a new context of shared leadership.

Improving America's Schools Act of 1994

This act is legislation enacted by the 103rd Congress that authorized Title VII grants for bilingual and ESL education (Improving, 1994).

Limited English Proficient (LEP)

Students with limited English language ability are identified as LEP until they have reached fluency. LEP is the term used by the federal government in identifying these students; however, this term in not widely accepted by ELL educators. The term

ELL (English language learner) has replaced it. The term ELL has achieved a more positive connotation than earlier terms (Ovando, Combs, & Collier, 2006).

Primary Language

The primary language is the first language which a student acquires. It is also termed the native language.

Project-Based Learning (PBL)

In project-based learning, students develop as teachers facilitate high-quality investigations into topics that are intellectually challenging and interesting to the students. Studies are open-ended in nature, allowing students to evaluate and critique their own progress. The project culminates in creation of one or more products that help demonstrate student mastery of critical content and skills. Clear expectations are given in regard to what constitutes high-quality work. Measurement of student performance is valid and reliable. Multiple assessments are encouraged.

Second Language Acquisition (SLA)

This is a language learning context where students are learning English who are not native speakers of the language. There are many different instructional approaches.

Texas Assessment of Knowledge and Skills (TAKS)

The TAKS is a criterion-reference test administered in the state of Texas to students in the elementary schools at third, fourth, and fifth grades. Third-grade tests cover reading and math. Fourth-grade tests cover reading, math, and writing. Fifth-grade

tests encompass reading, writing, math, and science. They are administered in English and Spanish according to the language of instruction in the classroom. The Language Proficiency Assessment Committee (LPAC) determines the language of testing of each student on the campus.

Target Language

When students are learning another language, it is termed the target language, or often the second language.

Traditional Bilingual Program

ELL students in a traditional program are motivated to fully develop and continue in their primary language while learning English. Language arts and content subjects are taught in the primary language in grades PK-3. English instruction is provided incrementally in lower elementary grades until attaining a level of proficiency in the primary and target languages leading to 50% primary language curriculum/50% English curriculum in Grade 4 and a 40% primary language program/60% English language program in Grade 5. This definition generally refers to Hispanic English language learners (Freer & Rohatgi, 2005).

Two-Way Bilingual Immersion Programs

Equal combinations of LEP and fluent English proficient (FEP) students are taught together in an effort to attain full bilingualism for both groups. All students receive language arts and math, science, and social studies primarily in Spanish (or other language) in the early grades (K-3), and increase their English instruction until reaching

a level of proficiency in both languages that arrives to a 50% primary language/50% English curriculum in Grades 4-5 (Multilingual Department, Houston ISD, 2005).

CHAPTER II

REVIEW OF THE LITERATURE

As the treatment in this study was implemented as a comprehensive school reform initiative, it is important to provide a synthesis of the experience with the New American Schools movement in order to provide context for this study. In addition, this section will approach the varied interpretations of project-based learning in light of its impact on culturally and linguistically diverse students. Achievement issues for ELLs in developing reading, math, and language academic skills will be discussed. The chapter concludes with a discussion of the challenges facing school-wide innovations as identified in the literature.

History of Comprehensive School Reform

The modern-day school reform movement began in 1980. Murphy and Datnow (2003) divided school reform into three eras in the period 1980-2002. In the Intensification Era (1980-1987) most intervention was located in the government sector. In the initial efforts at reform, the government played a dominant role in prescribing what was to be done to develop and administer remedies. Most reform was top-down, especially from the State. This government model usually employed prescriptions, tightly specified resource allocations, and measurable performance components, which focused on parts of the system that needed remediation. Much of this framework was based upon effective-schools research. This research focused on specific content strands that would be built into the comprehensive school reform (CSR) movement. The reform

platform from the intensification era came under criticism due to its excessive reliance on government and little involvement by professionals and other stakeholders in the process. Critics of this movement claimed that the reforms did not reach the center of the problem and demanded that schools needed to be restructured in the fundamental way they were organized and governed.

A core belief of the restructuring movement was that teachers and their effective work with students was the key component to school success. There needed to be a "power distribution." Reform would not be *top-down,* but based on the empowerment of teachers and the restructuring of site-based management. These changes involved a total restructuring of schools. The reform needed to be more radical than simply trying to repair the current models.

The two broad areas of reform in the restructuring movement were: decentralization/site-based management and initial piloting of school choice. Teachers, administrators, and community members shared the responsibility of decision-making at the school level. Furthermore, reformers introduced the concept of "market-sensitive" measures of accountability. Parents could select the school, and schools were rated as to their success based on various accountability systems. This brought pressure to public schools to be competitive with other sources of education (Murphy & Datnow, 2003).

As a result, schools had to offer programs that could demonstrate measurable success. Out of this movement the Academic Excellence Indicator System (AEIS) was developed by the State of Texas. (Texas Education Agency, 2006). This system places each school on a rating system of Unacceptable, Acceptable, Recognized, or Exemplary.

If a school falls under the Unacceptable category the campus and district administration must notify the parents of other schools of choice that are available for their children to attend. Now school programs will compete for the market of young learners.

In the early 1990s, public schools entered into a stage of reform that is distinct from the previous period of restructuring and intensification. There still existed the vision that changes needed to be made; but for the first time, actual models of school reform came to the forefront. The government reform model dominated efforts to develop standards and accountability mechanisms. More recently there was an interest in capacity building strategies (Murphy & Datnow, 2003).

State government and organizations developed standards in content, performance, and opportunities to learn. As a result of a federal audit, it was recommended that state agencies develop an agency-wide plan for federal monitoring that included a shift to a risk-based monitoring system. Texas House Bill 3459 of the 78th legislature redirected the agency's monitoring activities to include a new performance-based system to evaluate the effectiveness of bilingual education (Texas Education Agency, 2005). In addition, accountability systems were instituting more rigorous assessments of student performance in regular classrooms as well as classrooms for bilingual/ESL students. With the re-authorization of the Elementary and Secondary Education Act, termed No *Child Left Behind*, many schools participating in comprehensive school reform projects discovered additional pressures for their students to perform well on statewide and nationwide assessments (Genesee, Lindholm-Leary, Saunders, & Christian, 2005). There were sanctions for campuses that did not meet

expectations on a variety of assessments; e. g., Performance-Based Monitoring Assessment System (PBMAS), Adequate Yearly Progress (AYP), and Annual Measurable Achievement Objectives (AMAOs) for LEP students.

A plethora of approaches including school-based incentive programs, reconstitution of schools, and district loss of funding were used to hold schools and teaching professionals accountable for student outcomes. There was particular emphasis on the improvement of teaching through various standards of effectiveness being developed across the states. Although states were developing standards for the teaching profession, other stakeholders such as master teachers, coaches, and institutions of higher learning were part of the development process.

Historical Overview of Project-Based Learning

Project-based learning provides a unique setting for English language acquisition. It is based on a collaborative team setting where students discuss, plan, assess, and evaluate their "projects." Teachers have assigned students to complete projects for many years. Teachers through the years have involved their students in hands-on activities, multidisciplinary themes, field trips, discovery learning, laboratory investigations, and culminating projects. In early works one can identify the label *project* associated with activities such as sewing a dress, observing a chick hatch from the egg, or learning the history of basketball (Schwartz, 1998). According to Kilpatrick (1918), the focal point was that students learn and retain information most effectively when they are very interested in the topic. More recently, interest in this approach had subsided and only a few teachers consistently implement this practice.

Opponents of project-based learning have cited various reasons for its failure in classrooms: limited time to create curricula, limited materials and resources, large class sizes, and administrative structures focused on national assessments rather than freeing the teacher to build alternative instructional media (Cuban, 1993; Schwartz, 1998). However, there is a distinction between the project-based learning that is currently being advocated and the former tradition of *doing projects*. Thomas (2000) stated that former efforts at gaining widespread acceptance for hands-on and discovery learning failed because curriculum developers did not consider the nature of student motivation and did not give adequate importance to the students' perspective and point of view. In other words, if students are included in the development of the projects, they are more likely to be motivated to become actively involved in the learning process. Authenticity, constructivism, collaboration, and the significance of gaining basic skills in the context of complex problems are a few characteristics some authors have used to further differentiate between project-based learning and former practices involving projects (McGrath, 2002a).

Although project-based learning is based on *projects*, these projects include authentic content and assessment, teacher facilitation, and the inclusion of adult-oriented skills. Some models of project-based learning also add several other characteristics such as using a "driving question" to initiate inquiry, using technology-based tools, community or service experiences, and multidisciplinary themes (Krajcik et al., 1998). Research in the area of project-based learning has become just as diverse as the varied definitions given to this approach. Thomas (2000) in his extensive review of PBL

reported that the variety of practices under the heading of project-based learning make it difficult to further define what project-based learning is and what it is not.

While his comments are applicable to other learning methods as well, Schwartz (1998) discusses the usefulness of project-based learning. Students acquire content and skills while becoming aware of their learning so as to take on more responsibility and ownership. Much of this awareness may be described as metacognition—knowing the learning goals, self-assessing progress, and understanding that revision is a natural component of the process. In addition, students recognize the role of scaffolds, resources, and social structures that support revision. The facilitator role in PBL encompasses some applications of scaffolding. Schwartz (1998) introduced four principles of design for project-based learning as: 1) defining learning objectives that guide students to higher levels of cognition, 2) providing scaffolds such as exemplars with contrasting cases, coaching, and incremental development of problem-based learning activities before initiating projects, 3) encourage and sustain varied opportunities for self-reflection and revision, and 4) planning social structures that promote student participation and a sense of ownership.

Teachers may be concerned how the topics for the projects are generated. There is no simple diagram to describe the teaching process. Many teachers simply use a trial and error process as the projects are conceived and developed jointly between students and instructor-facilitator. This method may appear haphazard at first glance but the training involved for the teachers is actually quite extensive.

Instructors may also need additional supports to engage in scaffolding required by PBL. The first principle, providing learning objectives, establishes a foundation where students learn the why and how of each project. Yet students and teachers may need additional supports to engage in this relatively new curriculum design. McGrath (2002b, 2003) describes how support to teachers and administrators can be provided by curriculum mapping and meeting in small groups about every two months to adjust learning objectives. One of the most essential scaffolds for projects is assistance to learners in understanding and verbalizing why their current activities are relevant to the overall goals of the project.

Recent research (Karahoca, Karahoca, & Uzunboylu, 2011; Markham, 2011) in project-based learning has focused on the area of technology as a scaffold. Technology rises above the use of simple drills to become a resource in both English and other world languages. This technological scaffold bridges the gap for English language learners, as they can toggle between two languages and two cultures to better comprehend information. In addition, many students can have web conferences with other communities around the world. It is the means by which students can communicate with other cultures and classrooms around the world. Students can exchange ideas on community projects of global concern. Once the research is finished, students can begin to incorporate technology into the multimedia presentations of their culminating projects. McGrath (2003) describes PBL as an approach that typically focuses teaching and learning around a problem that is a central focus of the curriculum, involves the

development of a learner community, and concludes with a culminating artifact (e. g., a book, web site, or multimedia presentation) to an outside audience.

Teachers must manage and maintain varied assessment options that may include product portfolios, rubrics, and normative evaluations. Most advocates of PBL design (Blumenfeld et al., 1991; Diaz-Rico, 2004; Kieper, 1999; Krajcik et al., 1998; Markham, 2011; McGrath, 2003; Petrosino, 1995) include a product as a culminating activity. Markham (2011) further asserts that the process is an ongoing, reflective process that should lead to further inquiry. After project activities are completed, students and teachers debrief, reflect, and evaluate the project against criteria.

The teacher facilitates the design of the lessons to involve the learner in an interactive process which transitions students from passive receivers into actively engaged learners. Most researchers (Blumenfeld et al., 1991; Blumenfeld et al., 2000; Diaz-Rico, 2004; Edwards, 1993; Kieper, 1999; Markham, 2011; McGrath, 2003; Petrosino, 1995) mention the use of interactive learning through what is termed small group instruction and cooperative learning. Not only does this interaction benefit the metacognitive skills of the engaged learners, it also supports the social construction of best practices for second language acquisition. It can also be challenging, as teachers must develop classroom management skills and employ dynamic motivational techniques. Wilhelm (2007) described the six features of collaborative effort of PBL as: cooperative learning that increased student collaboration, individualized instructional planning and feedback, assessment that involved student self-assessment as well as teacher evaluation, teachers who fulfilled the role of coach or facilitator, authentic

contexts where real-world connections could be made, and reflection during and after the project where participants could grow after realizing their efforts.

Many projects involve interaction through social networks within the community as part of the project research or as part of the audience. One of the greatest challenges in implementing project-based curricula is that simultaneous changes may occur in the areas of curriculum, instruction, and assessment—changes that are "often foreign to the students as well as the teachers" (Schwartz, 1998, p. 306). Markham (2011) describes the process as a non-linear problem-solving process that can be chaotic. There is recognition that greater support must be provided in the form of sustained professional development for PBL to be implemented and institutionalized in schools.

PBL and Constructivist Learning Theory

Many of the principles of PBL are grounded in constructivist theory. Cognitive theorists Vygotsky (1978) and Piaget (1929) both claim that (schema) students' prior knowledge is the foundation for constructing new meaning. In addition, the social context of the classroom is significant in facilitating this process. A prime example is the Emilio Reggia Approach. In this approach to early childhood education (Edwards, 1993), the child is the focus of the classroom and the teacher becomes a facilitator as children reflect and develop questions they want to know about in the real world. The projects or lessons emerge as children seek to find answers about their world and their community. This social constructivist concept of emergent curriculum is based on the image of children as being empowered. "The emphasis is placed on seeing the children as unique subjects with rights rather than simply needs. They have potential, plasticity,

the desire to grow, curiosity, the ability to be amazed, and the desire to relate to other people.…" (Edwards, 1993, p. 102).

Serving as an instructor in the aforementioned classroom requires a skillful teacher/facilitator who is capable of promoting and supporting active student behavior. The teacher/facilitator assists students to identify where their choices have been successful, so that they can continue to use those strategies. The facilitator attempts to provide students freedom, choice, and encouragement. Reflection is another means of promoting metacognitive awareness. If students can reflect on various processes and identify which ones are successful, they can gain confidence in their ability to positively affect their learning. As students gain confidence in their strategic abilities, they will be more motivated to engage in strategic discovery

Constructivists believe that learners build from their background knowledge to construct new knowledge. This contextualization of learning applies not only to authentic experiences for PBL but also to second language learning. The use of real-world problems and authentic materials (e.g., primary sources, hands-on activities) in PBL are an application of this concept. Building from the known (schema) to the unknown is especially appropriate when working with culturally and linguistically diverse learners who have great difficulty at times making connections with abstract concepts which are not in their realm of understanding or experience. Krashen (1981) and Cummins (1994) discuss schema theory as an important tenet in second language learning. When concepts are taught in real-world contexts, learners are able to own those concepts and vocabulary and transfer them to future experiences.

Other instructional features in PBL are supported by research in social constructivism. Russian psychologist Lev Vygotsky (1978) investigated the role of language in human development. One significant theory he expounded was the zone of proximal development (ZPD). The ZPD is the space between the actual development, determined by the learner's actual individual problem-solving skills, and the prospective development. Rather than attempt to simply transmit all the answers to students, teachers provide supports—scaffolds—for students to discover the answers independently or with partners. The ZPD is the interpersonal space where ideas can intersect and can be collaboratively expressed. Newman, Griffin, and Cole (1989) labeled this space the "construction zone." This can involve mini-lessons, teaching tools, sets of contrasting cases, and beginning with problem-based learning activities before initiating projects (Schwartz, 1998). The role of facilitation belies this concept of scaffolding, as students are acquiring language as well as acquiring new concepts.

Other theorists fear that the successful implementation of PBL may be misinterpreted. Mayer (2004) describes broad inquiry-based methods that emerged as a result of constructivist ideas. Bruner (1961) applied rules for problem-solving. Papert (1980) applied discovery learning to computer programming concepts. Mayer did not support these approaches because he contended that student-centered, discovery learning reduced the amount of guidance and that the role of teachers could fail to affect gains in student autonomy and problem-solving skills (Kirschner, Sweller, & Clark, 2006; Mayer, 2004). Opponents claim that the tenets of constructivist, project-based learning may not achieve student success as this teaching method may leave too much judgment

to the learner. They caution that a self-directed approach could prove to be ineffective. (Kirschner, Sweller, & Clark, 2006).

The use of technology in computer-assisted versions of PBL can be reflective of constructivist theory. Computers are not considered an instrument of endless drills and practice of isolated skills. Computer technology is integrated into the study of the project as a means to access authentic references and resources, contact experts, and create authentic documents. The computer can be viewed as a means for scaffolding of authentic activity (Blumenfeld et al., 1991). In addition, through computers classrooms can establish social networks to reach other classrooms around the neighborhood and around the world (Cummins & Sayers, 1995; Cummins, Brown, & Sayers, 2007).

PBL and Second Language Acquisition

Due to the language context of project-based learning, there are many opportunities for interaction in the classroom. The teaching of English language learners has undergone a radical change over the last two decades. The older curricular approaches were focused on discrete skills in grammar, spelling, and punctuation. Second language research has evolved from the behaviorist approaches, extensive drill, dominant in the 50s and 60s (Sidman-Taveau, 2005). Krashen (1981) questioned the effectiveness of the focus on grammar by claiming that language acquisition was a subconscious processes. Learners develop language as a result of comprehensible input between two speakers. This use of meaningful language to communicate parallels many of the PBL concepts, as it is authentic and bases its study on the schema of the learner.

Krashen's Affective Filter Hypothesis (1981) focuses on the premise that affective variables such as motivation, self-confidence, and anxiety play a role in second language acquisition. Krashen asserts that English language learners benefit from a low-stress environment where students will store information when the brain can receive information and retain it (Zadina, 2004). On the other hand, low self-esteem and high anxiety could cause the student to reach a blockage to retention of new information. The idea that individual learner variables affect the learning process for second language learners continues to be a very predominant theme in SLA literature (Sidman-Taveau, 2005).

Instruction through PBL provides the setting for second language acquisition as well or better than other methods. From the collaborative development of the topic of inquiry to the product or culminating activity, PBL may enhance, encourage, and even demand that students use all four language-learning domains—listening, speaking, reading, and writing—in this cyclical process of learning through authentic contexts and inquiry.

Although there is research available regarding project-based learning in other disciplines—medical field (Barrows, 1996) and electrical engineering (Hsu, 2012) for example—there are few empirical studies regarding the use of PBL for language-minority students in elementary settings; although there are brief references to PBL in ESL textbooks (Diaz-Rico, 2004).

Cummins and Sayers (1995) and Cummins, Brown, and Sayers (2007) promote digital learning for students to advance in their language acquisition as well as

higher-order thinking skills. Cummins interprets language use as a negotiated reality in which students combine their use of social and academic language to pursue the answers or possibilities for an inquiry-based project. Such interactionists believe that language development results from the interaction between learners and the language environment, assisted by innate cognitive processes. Children learn language by interacting with one another and by using it as a tool to learn something else, such as listen to a story, seek information on the internet, or discuss an aspect of their projects (Coelho, 2004; Edwards, 1993; Vygotsky, 1978). In this way language learning may be accomplished through PBL lessons.

The teacher's role as facilitator of the instructional conversation (Goldenberg, 1991) is supported and enhanced through the process of developing inquiry into the chosen topic. This approach derives from the assumption that students themselves play a significant role in constructing new knowledge and in acquiring new understandings about their environment. The teacher still plans and organizes, but the emphasis is less on delivery of instruction and more on facilitating and guiding student understanding throughout the length of extended verbal interactions. In fact, just as in project-based learning, the discourse may take another unanticipated direction.

Samway and McKeon (2007) summarize the indicators of effective schools for English language learners: high expectations for limited English proficient and language minority students, active use of language-integration of language development with content-area development, support for concept development through the native language,

comprehensive training for teachers and staff, instructional leadership, and supportive whole-school contexts.

Effective schools reach out to parents and to the larger community, using them as educational resources and as partners in gaining a better education for their students. These indicators of effective schools align with the goals of project-based learning.

ELLs and Math Achievement

English language learners face a dual challenge in their educational development: subject-area knowledge and simultaneous acquisition of a second language. Even though many math symbols are universal, the primary difficulty for English language learners is mathematical word problems which can be grammatically and linguistically complex. English language learners struggle to demonstrate their understanding of math through their second language. Abedi, Hostetter, & Baker (2000) claim that test items with linguistic demands in subject-area assessments could be a source of frustration for ELLs. Content-area experts want to ameliorate the situation by identifying specific solutions to these academic language difficulties.

Martiniello (2009) studied students' responses on a 4th grade level state mathematics assessment completed in spring 2003. The study group included 3,179 ELLs, whereas the non-ELL group consisted of 65,660 students. She divided the vocabulary into issues of linguistic complexity in word problems or math language. Through this division, it might be possible to determine where student issues with understanding surface. She called this Differential Item Functioning (DIF). Martinello gathered a group of experts in reading, linguistics, and bilingual education and requested

that they codify the vocabulary on the math test into 3 groups: text, pictures, and schematic pictures (images that would display a relationship between the images or concepts).

Based upon an earlier hypothesis, the more difficult the linguistic demand of the vocabulary, the greater the differences between ELLs' and non-ELLs' success on the math assessment. The main effect of the linguistic demand on DIF was significant ($p < .001$). In searching for solutions, researchers found that when the mathematical word problems included pictorial images that scaffolded students to draw from their schema (background), they were able to respond to the questions.

Martiniello (2009) identified the following text difficulties for ELLs: 1) syntactic, embedded adverbial and relative clauses; 2) lexical unfamiliar vocabulary, high-frequency words learned at home, and polysemous words; 3) references to mainstream American culture; and 4) test or text layout. Martiniello suggested that further efforts should be made to investigate which forms of scaffolding are most effective for English language learners. When other researchers supplied pictorial support to a text-only math word problem, investigators found that it was not supportive. (Moreno, Pirritano, Allred, Calvert, & Finch, 2006). It was the schematic support that enhanced understanding.

Other researchers have investigated what techniques could ameliorate this situation. A number of studies suggest that strategy instruction in word problem-solving can be productive in helping English language learners. Many studies discuss the use of direct and explicit strategy instruction (Fuchs, Fuchs, Finelli, Courey, & Hamlett, 2004;

Griffin & Jitendra, 2008; Jitendra, Sczesniak, Griffin, & Deadline-Buchman, 2007) using collaborative learning strategies during instruction (e.g., Fuchs, Fuchs, Yazdin, & Powell, 2002).

Orosco, Swanson, O'Connor, and Lussier (2011) employed a Dynamic Strategic Math (DSM) strategy with ELL students to assist with linguistic and cognitive issues in math by categorizing the linguistic demands into three different groups. The participants were selected for low reading and math scores. Researchers claimed that the difficulty with math involved reading comprehension, and proposed an intervention called Dynamic Strategic Math Probe (DSMAP). All students were administered four math word problems individually for each session for 17 sessions. If the student could answer the problem with the first question, he or she received five points and full credit. Through a series of questions about linguistically modified math problems, the student demonstrated the level of intervention needed. All students demonstrated gains in solving math word problems. Although the sample of six students was too small to generalize the DSMAP method to other populations, the study confirms that ELLs might have difficulty solving word problems because of the lack of language development. The investigation supports the interaction that takes place between individual student and teacher, but this would not be effective in a standardized test setting. If a performance-based assessment were administered, this strategy might be effective.

Goldenberg (1991) emphasized the role of instructional conversation in the negotiation of meaning in classrooms. Oliveira et al. (2015) supported the use of spoken discourse and interaction between two subjects to repair communication. When a

breakdown in communication occurred in an academic learning setting, Oliveira et al. explored how it was possible for the communicants to repair the breakdown. After the researchers transcribed student responses, they coded the language approaches. The types of language approaches used were: translation, paraphrasing, and questioning.

When students are learning English and content, it doubles the work they must do, as well as the cognitive processing. When students are successful in mathematics in Spanish (or other first language), they can transfer those math skills but a second academic language becomes a mitigating factor in both learning and demonstrating math skills.

ELLs and Reading Achievement

There has been controversy about the most effective way to teach English reading to English language learners. When the No Child Left Behind Act (NCLB) was passed in 2002, bilingual education programs were not supported. All ELLs would participate in a statewide testing program as stipulated by the new legislation. Wright (2007) argued that students should learn English as quickly as possible. On the other hand, bilingual education advocates argue that students can be gradually transitioned from their native language into English reading (Goldenberg, 1998; Thomas & Collier, 2002).

There are three commonly implemented programs for bilingual students: transitional or early-exit bilingual, maintenance or late-exit, and two-way or dual language education. All three of these program designs have as their goal for a student to function successfully in the mainstream program in English. In transitional bilingual

classes, students not proficient yet in their native language receive instruction in their native language in all subject areas as well as instruction in English as a second language, for a limited number of years. There is then a transition into English which occurs after two or three years. The goal of the transitional or early-exit program is to mainstream students into all-English instruction as soon as possible.

The maintenance or late-exit bilingual program emphasizes instruction in both languages in Grades K through 5 or K through 6, with no continuation into middle school. Students receive content-area instruction in both languages. This program might be successful if students enter at PK, but it is very difficult to gain academic English in three or four years. There are many immigrant students who enter at a later point in their educational career (Hakuta, Butler, & Witt, 2000).

The final program model is a two-way model. Two-way bilingual programs integrate language majority and language minority students in a school environment that promotes bilingual proficiency and high academic achievement. In these programs, the study school is generally an 80-20 two-way model which includes native Spanish language speakers and fluent English speakers. A preschool model of 90-10 (Spanish, English) is also designed and implemented to accelerate language proficiency of students who enter the program with low scores in Spanish in PK and K. Literacy and math are introduced in the minority language (Spanish) in Grades K through 1. The majority language is introduced in grades 2 and 3. The use of the majority language in the curriculum gradually increases until there is a 50/50 balance by Grades 4 and 5. Lessons

are never repeated or translated in the second language, but the concepts are reinforced across the two languages in a spiraling curriculum.

Krashen (2004a) reviewed studies of two-way performance assessments of reading comprehension. He was seeking robust analyses of reading performance in the two-way programs. He reviewed Sugarman & Howard (2001), De Jong (2002), and Lindholm (2002) and found that data were provided using standardized tests, but none used comparison groups in their analyses. Cazabon, Lambert, and Hall (1993) reported on the English reading proficiency of Spanish-speaking children in a two-way program in Massachusetts, as compared to children in a "standard bilingual program." Two-way and comparison students were matched by using the Raven Matrices test to measure intellectual ability and socioeconomic level. Students in the "Amigos" program performed behind comparisons on an interview in Grade 1 but surpassed their counterparts in Grades 2 and 3. The study was limited by sample size and duration. Krashen found that most studies were limited in sample size (Alanis, 2000; De Jong, 2004; Cazabon, Lambert, & Hall, 1993). He did not find studies that were examples of robust statistical analysis.

Cheung & Slavin (2012), in their review of effective reading programs for ELLs, focused their investigation on all types of programs with successful outcomes for reading, regardless of the program configuration. I further researched two initiatives that were most aligned with the PBL Techno-learning intervention. The Project ELLA, a three-tiered structured intervention for Hispanic ELLs and BCIRC, a reading

intervention designed and implemented from Success For All; both reported results using robust statistical analysis.

Irby, Lara-Alecio, Quiros, Mathes, and Rodriguez (2004) designed an intervention for Hispanic ELLs which consisted of 3 tiers: 1) language arts, mathematics, science, and social studies in Spanish in K-1; 2) English/ESL intervention including three integrated strands-ESL tutorials from a commercial product, Santillana Intensive English, (Ventrigilia & Gonzalez, 2000), storytelling and retelling, and academic oral language in kindergarten and first grade; and 3) ESL tutorials provided by trained paraprofessionals. Teachers were provided consistent professional development by the researchers. Irby and Lara-Alecio as principal investigators of Project ELLA have kept evaluating, improving the model, and collecting data for the future benefit of bilingual programs.

The next ELLA study was a 3-year (K-2) longitudinal randomized study (Tong, Irby, Lara-Alecio, & Mathes, 2008) derived from a previous 4-year study. The focus in that study was to look at the effectiveness of the ELLs intervention in late-exit TBE classrooms classified as developmental bilingual programs. The treatment schools (N=10) received the ELLA enhancements in a 70% Spanish and 30% English model. The treatment groups received more time allotment of English instruction with specific ESL interventions. Treatment students received a daily structured English intervention (75 minutes in kindergarten and 90 minutes in first and second grade).

The intervention included two levels. Teachers and para-professionals attended biweekly workshops for 3 hour sessions to: a) review and plan lessons, b) self-assess and

confer about student progress, c) review progress as teachers, and d) receive ESL strategy training. Examples were language scaffolding, shared reading, word walls, preview and review, and language experience approach. Treatment group teachers followed a script to provide instruction. Additional training included best practices about translation and code-switching between languages. Training both teachers and para-professionals is an important step in realizing that public schools include various levels of instructors. Para-professionals provide tutoring for students and need to receive the professional training as well.

There was also a three-tiered student intervention similar to Response to Intervention (RTI). Tier I was the regular Spanish curriculum (language arts, science, math, and social studies). Tier II intervention included the English/ESL intervention which contained three strands: English/ESL instruction; early intervention in reading, story retelling, and academic oral language (AOL) and daily oral language in Grades K through 2. In Tier III small group instruction was provided for the students with most academic need. Students would receive small group instruction ranging from communication games to English reading fluency and comprehension tutoring at the higher grade levels.

The control group (N=9) used a typical TBE model of 80% Spanish and 20% English. There was no differential attrition rate between groups. The findings indicated that treatment students performed better than the control group in the areas of oral language, pre-literacy skills, reading fluency, and comprehension on English measures. Tong, Lara-Alecio, Irby, and Mathes (2011) continued investigations in ELL

performance in grades kindergarten to the end of first grade. This study used a randomized selection across treatment and gender. A group of 140 students were randomly selected (70 for each condition). Students were tested in oral language and literacy performance. Oral language testing took place in three time points (fall kindergarten, spring kindergarten, and spring of Grade 1). Literacy was tested twice, fall and spring of Grade 1.

Results indicated that students in the Grant ELLA Transitional Bilingual Education (ELLA TBE) program exceeded students' performance in the control group on two of the six English measures (Idea Oral Proficiency Test [ES= .48] and Woodcock Passage Comprehension [ES = .15]) The treatment group, however, scored significantly higher than the control group on five of the six measures in Spanish. The mean effect size was 0.28. This is a testament to the maintenance of the primary language which should be at a high performance level in kindergarten and Grade 1. Project ELLA, over the three linked studies produced a weighted mean effect size of 0.15 which is a small effect size. It is important to note that these structured interventions improved ELL performance in grades K-2 which are the most critical years of literacy development. This aligns directly with the literacy goal of the PBL intervention in this investigation.

Calderon (1998, 2004) conducted 2 studies using the Bilingual Cooperative Integrated Reading and Composition (BCIRC) model. In the first study (Calderon, Hertz-Lazarowitz, & Slavin, 1998) cooperative learning was implemented as a possible intervention for bilingual students learning English using the BCIRC model. Students from Ysleta Independent School District of El Paso, Texas participated in the

investigation. Pretest scores and demographics were used to match the treatment (3 schools) and control (4 schools) groups. Two cohorts were assessed; the treatment group was placed in heterogeneous groups of four to improve reading skills. This is the recommended configuration for cooperative groups. Students engaged in activities such as vocabulary, summarization, reading comprehension, and language arts. Instructors used materials that were designed specifically to bridge Spanish reading skills already attained into English reading skills. All teachers were trained in cooperative learning strategies. The teachers in the control group did not use cooperative learning on a daily basis as was part of the daily routine for the treatment group. The treatment group scored significantly higher on the Bilingual Syntax Measure with a mean effect size of 0.54.

Calderon (2004) conducted a 1-year match control experiment with students who had been in the Spanish Success For All (SFA) reading program and were transitioning into English reading in third grade. The experimental program included an adjusted version of (BCIRC), which consisted of components from English SFA (Reading Roots), including videos and explicit instruction in English vocabulary. The 283 Spanish-dominant students were compared to students in other SFA programs. Treatment students scored on the English Woodcock Word Attack [ES = 0.21], Passage Comprehension [ES=0.16], and Picture Vocabulary [ES = 0.11], with a mean effect size of 0.16.

In reviewing the research, I noticed some correlations with the PBL curriculum such as cooperative learning, consistent professional development, and fidelity of implementation with clear instructional guidelines such as Success For All, Project

ELLA, and formative assessments. Both research groups used a structured model with matched treatment-control group configurations which is considered to be robust statistical analysis.

Challenges in Comprehensive School Reform

As project-based learning became a comprehensive school reform model, the entire school reform as well as leadership experienced changes. Models of comprehensive school reform purported a new vision of shared leadership.

Fullan (2007) claimed that serious education reforms would never be achieved until there was a significant increase in the number of leaders and other participants who have internalized and can actualize basic knowledge of how change takes place. He maintained that in order for reform to be successful, educational leaders needed to understand how to manage change. This involved a break from traditional methods of school leadership. Formerly, principals were to be strong organizational managers, with autonomy over hiring and dismissing teachers, purchasing curricular materials, and controlling most decisions at the campus level. There had been a tendency for managerial concerns to overtake leadership functions (Duke, 1988). On the other hand, Bryk, Sebring, Kerbow, Rollow, and Easton (1998) and Elmore (2000) supported the principal as an instructional leader who spent time in classroom observation, modeled lessons, and coached teachers with difficulty. Elmore (2000) contended that administrative leaders were primarily concerned with relationships, creating a common culture, and holding individuals accountable. The principal as leader was the key to success or failure.

Bryk and colleagues (1998) studied principals in Chicago reforms and identified one-third of schools that showed improvement. The successful principals in these schools exhibited the following goals: an institutional focus on student learning, efficient management skills, and integrated pressure and support in their actions. Another study conducted focused on leadership in 12 schools in England (Day, Harris, Hadfield, Toley, & Beresford, 2000). These schools had established networks of professionals where the leadership centered on relationships, professional standards, and monitoring student performance. Decision-making was collaborative; although leaders reserved the right to be autocratic when necessary. Collegial cultures were maintained by individual accountability to specified external policies. This context could result in tensions that must be mediated by effective leadership cultures.

In a four-year longitudinal study, Kirby, Berends, and Naftel (2001) found that the principal leader was the most important predictor of success in implementation, both at the teacher level and the school level. Principal leadership was measured in the longitudinal survey as an index that included specific practical actions, especially more effective ones such as: clearly communicated expectations, supported and encouraged staff, supported the student discipline plan, communicated with teachers about instructional practices, trusted in the expertise of the teachers, and demonstrated interest in teacher professional development. Schools that reported strong principal leadership reported high levels of implementation. Teachers completed the same survey study of the principal leadership in a high-poverty Texas school. Researchers reported that high

levels of principal leadership were strongly related to elementary students' achievement scores in reading and mathematics (Berends, Bodilly, & Kirby, 2002).

School reform altered the role of the principal in many ways. The principal gained additional power by having a budget with discretionary funds. There was greater control over the hiring of teachers. In addition, principals gained authority over professional development, selection of curricular materials, and, in some cases, over assessment. The budget and school improvement plan was linked directly to the instructional program of the school. Yet legislative changes could be seen as encouraging a principal to shift away from traditional forms of leadership, i.e., less autonomy in organizational decisions and classroom instruction, to forms of shared leadership where goals and planning were established through collaborative decision-making with community members and teachers (Bizar & Barr, 2001). The challenge for a principal was how to maintain the institutional authority inherent in a management role, while at the same time engaging in shared forms of leadership. The traditional forms of institutional management tended to lack flexibility and to become nonfunctional under conditions of change and stress. Fullan (2007) supported this new type of shared leadership where the principal became a people-person, inspiring teachers to play a more active role in governance of the school.

Louis and Miles (1990) made a distinction between leadership and management, but emphasized that both were essential to school success. Leadership related to mission, direction, inspiration; while management included designing and implementing plans, completing tasks, and demonstrating effective interpersonal skills. As Louis and Miles

approached change, they discussed the action areas for both management and leadership. The management aspect involved negotiating demands and resource issues with the milieu, and consistent problem-coping. The leadership aspect concerned articulating a vision, evolving shared ownership, and planning. Both of these areas had to be addressed by the principal or by a leadership team (Leithwood & Montgomery, 1982).

Schools in the Chicago public school systems participated in one of the largest reform movements. The principals' role during reform was redefined to demand skills and strategies that were not part of the repertoire of many newly hired principals. Key to the role of leadership in reform was the ability to communicate effectively and gain the commitment of parents and teachers to the school's goals and vision. Reform research focused on the cultural aspects of leadership, which included communicating clearly the school's vision, socializing new members to the school, and maintaining traditions and beliefs (Fullan, 2001, 2007). The effect of this type of leadership was to bring together school participants and create a positive school culture. Principals asserted that members of the organization were untrained and unprepared. Fullan (2001, 2007) asserted that principals could be trained in the work that they needed to do. The work was complex, and the principal must be a leader who would be adept at working within the policies, practices, and associated interaction that would evolve. Just as leaders in business organizations offered reform models, schools could follow the lead of successful leadership models in business organizations.

However, there were obstacles to this form of leadership, a salient issue being principals' hesitancy to relinquish control. This type of administrative concern is based

on a lack of trust and respect for teachers and parents. Changes begin with trust. “Trust is the essential link between leaders and led, vital to people’s job satisfaction and loyalty, vital to followership” (Evans, 2007, p. 135). Furthermore, Evans explains that trust is especially important in organizations that present fewer extrinsic motivators (e.g., financial rewards, power, social position). School leaders seeking change needed to think about how they could inspire trust in their constituents. Innovation required more than trust; it required confidence. The key to both was authenticity. Educators wanted leaders who knew education, who would not fall victim to the most recent innovations, but they especially wanted leaders who conveyed “oneness,” that envisioned education from the instructor’s point of view, and understood the issues in the context of the classroom, students, and parents.

One specific way that principals demonstrated leadership was their involvement in the reform model selection. Principals could make the selection and then attempt to convince staff of the viability of the proposed design model. In most cases principals could select a team of teachers or leadership to visit demonstration sites and report back to the faculty, who decided if they would participate. The whole staff and faculty could vote on implementation of an innovation that affected the entire campus. In the existing Techno-learning implementation, both methods were employed. Administrators and leadership teams visited other campuses in Houston as well as other areas of the United States. Then they returned to the campus to share their reactions with faculty and staff. Finally, faculty and staff voted to reject or accept the project. Two campuses decided not to participate.

During the reform process, tensions may develop as new principals become leaders in schools with well-established cultures and innovations. It is the challenge of the new principal to establish rapport with staff and continue the shared vision of the district. In the case of urban school reform, it is important that the design be sustained. With too many changes, some teachers may have a "wait and see" attitude in regard to a new principal.

By 2000, most principals encountered additional pressures. No Child Left Behind legislation demanded that schools reach a minimum standard of achievement in order not to be classified as "low-performing." Sanctions that could result from this could be reconstitution of the faculty, open enrollment for students, and a notice sent home announcing that the campus did not meet minimum criteria for academic achievement. In the state of Texas House Bill 3459 of the 78th Texas Legislature, Regular Session limited and redirected the state agency's monitoring activities. The new legislation added a section of performance-based assessment on bilingual education, local district responsibilities for compliance to all requirements of state programs, and more intensive use of data integrity, Performance-Based Monitoring Analysis System (Texas Education Agency, 2005).

In a 6-year study, Leithwood, Louis, Anderson, and Wahlstrom (2004) concluded that school leaders most affected student learning by influencing teacher attitudes and work environment. A leader's influence on teachers' expertise had far less effect on student learning. Horng and Loeb proposed a new definition of successful school leaders. Their extensive research in three large urban districts found consistently that

schools representing growth in student achievement had school leaders with strong organizational management skills (Horng & Loeb, 2010). Chirichello (2008) challenged the myth of principal leadership as having a single significant effect on school improvement projects. He claimed that school leadership involved teacher and staff collaboration rather than a single administrator.

Principal Turnover

Principals that leave their positions during a school reform project may have an effect on the sustainability of an intervention. Principals leave their positions for various reasons. In some districts principals are put in a district rotational system which requires they remain no more than 3-4 years on a campus. Principals can be replaced when a school has low standardized scores, with the theory that a new principal will be able to change the present situation. For example, for a time period North Carolina was experiencing a rapid turnover of principals, as district leadership was not likely to retain educators from less competitive colleges. Turnover may reflect an employee who has decided to leave, or an organization asking an employ to leave, or both. It cannot be assumed that all sitting principals are of high quality and should not be asked to leave (Partlow, 2007).

The age of accountability is changing the perception of what is acceptable leadership. Student achievement can be linked to schools, principals, and teachers. Achievement scores may be used to measure the effectiveness of a teacher, and in turn, the principal. Another assumption being made is that high teacher turnover is related to

principal effectiveness. This assumption is problematic, as it defines teacher turnover as negative.

From the standpoint of school improvement, changes in leadership affect the school culture and teachers' ability to function. Frequent principal turnover, often endemic in lower socio-economic settings and enrollment-diverse schools, is extremely detrimental to teachers and students. In some cases, principals may view principalship as stepping stones to better opportunities, and not choose to make a long-term commitment to a particular campus (Lemberger, 1997). When schools begin to experience frequent changes in leadership, the principals take less interest in the school vision than in their own career paths (Southworth, 1998).

Rapid principal turnover in schools often causes major effects. These schools are often reported to undergo skepticism among staff about principal commitment, a lack of shared vision, and an inability to sustain school focus to reach any meaningful change (Fink & Brayman, 2006). Miller (2013) reported that changing principals disturbs the focus on student achievement. Others contend that principal turnover unsettles the change progress when the administrator leaves and a new principal enters a climate and vision that he or she does not support or understand (Fullan, 1992).

Datnow and Stringfield (2000) discuss the loss of principals in the models of external reform in a four-year study of 13 schools that had chosen reform designs. In the third year of the study only 1 of the 13 schools was continuing to implement reform designs. Reforms expired in 6 of the schools. Changes in district leadership and politics affected sustainability of the reforms. In 1995-1996, the superintendent publicly

promoted the use of externally developed reforms. In addition, an Office of Instructional Leadership was created to sustain the designs' implementation. A year later a new district administration did not support externally developed reforms. The new administration removed the new department and district support for many of the restructuring schools.

PBL and Student Achievement

Although the reforms differ in their approaches to change, common to many of them are an interest in school-wide change and strong commitment to improving student achievement. One of the key factors in comprehensive school reform projects is collection of data to demonstrate measurable objectives in regard to student achievement. In light of district and state accountability requirements, it is appropriate to study standardized test scores. According to the New American Schools Development Corporation, project-based learning groups improved their standardized test scores over the 1997 to 1999 school years (Thomas, 2000). That investigation focused on elementary schools in an urban district. There are large-scale empirical studies that have been conducted on the effectiveness of project-based learning in improving student achievement, problem-solving abilities, and understanding subject matter at the elementary level. The following studies discuss the impact of PBL and comprehensive school reform.

Initial studies were conducted using the Memphis schools, Memphis Reform Initiative (MRI) by Ross and associates (Ross et al., 2001). Evaluators compared student achievement on the Comprehensive Test of Basic Skills-5 (CTBS-5) from the two

cohorts of 37 elementary schools which participated in 8 of the NAS identified school reform models Project-based learning was one of the models offered. The comparison group consisted of 61 non-restructuring campuses. The research design included collecting data in a pre- and post-reform data to determine a change score for each subject area tested. The subjects in the test composite were: reading, language, math, science, and social studies. After 2 and 3 years of implementation, student achievement at treatment schools was significantly higher than at comparison schools. Using the alpha level of .05, when all subject areas were averaged, the mean change score of p=.0035 for the restructured schools was a statistically significant difference. Significant change scores were also in Reading, p=.0051, Language, p=.0258, Math, p=.0107, and Science p=.0127. When change score results were delineated by reform design, Co-NECT, a PBL reform project, scored a moderately large effect size (ES=+0.57) for all subjects averaged.

By dividing the participants into cluster groups by socio-economic level, Cluster 1 being the lowest, the change scores (pre-and post-) displayed the most progress for the students in Cluster 1. Researchers began gathering data for this program even before the campuses had decided which innovation to implement. There were 3 years to gather data on measurable outcomes, but the researchers recommend more robust analysis of new systemic reform initiatives.

Ross and Lowther (2003) conducted a mixed-method large-scale analysis of schools in a PBL technology project. They investigated the Co-NECT school reform design in five urban schools using a matched comparison sample of four schools in the

same district. Schools were grouped socio-economic status (SES), free or reduced lunch, percent minority, and student mobility rate.

The researchers used a School Observation Measure© (SOM) to view strategies in the classroom. A 2 Program (Co-NECT and comparison) x 2 socio-economic status (middle and low) MANOVA was conducted on the SOM items. There was a program main effect: program main effect, $F(26,43) = 3.72$, $p < .01$; SES main effect, $F(26,43) = 2.41$, $p = .005$, and the Program x SES interaction, $F(26,43) = 3.25$, $p < .001$. Univariate analysis was conducted on each item.

Then a survey was conducted with the teachers. Areas of interest were: 1) school climate, 2) teacher commitment, 3) teacher of use of technology to learn (e.g., coaching, teaching strategies, and 4) student use of technology as an instructional tool. Schools with lower SES had more convincing results. Teachers and principals felt that students were more successful and engaged in learning as a result of the intervention.

Five subject areas (math, reading, language, science, and social studies) were assessed from 1998-2000 through Tennessee Comprehensive Assessment Program (TCAP). School-level analyses were justified as individual student scores were not consistently available. Results on the state-mandated standardized achievement test were mixed, evaluating both percentile groups as well as value-added scores. Three treatment schools demonstrated more positive results while two demonstrated less positive results compared to the control group schools and state norms.

More recently, Holm (2011) wrote a review of studies on project-based learning from 2000-2011. Four research areas were identified in her study: 1) effects on student

attitudes and self perception, 2) developmental effects, 3) effects on varied learners, and 4) teacher and setting attributes. Overall, Holm found that over the last 10 years, there were generally positive findings regarding the effectiveness of project-based instruction. Project-based instruction in Pre-K through 12th grade rendered enhanced content understanding, elevated levels of active learning, and positive perceptions of the subject area. The qualitative studies focused on clarifying participant reactions to experiences in project-based learning. In the studies about student perceptions, results were positive.

Two studies compared the effects of project-based instruction to traditional instruction in an early childhood setting. Although the samples were relatively small, project-based instruction was found to be successful in promoting more growth in language and concept development than traditional instruction. (Aral, Kandir, Ayhan, & Yasir, 2010). Other studies focused on the effects of project-based learning on various categories of learners experiencing school failure in traditional school settings.

Beneke & Otrosky (2009) focused on the benefits of the *Project Approach* which was implemented in the early childhood setting. Seven teachers participated in a qualitative study about teachers' perceptions about the *Project Approach.* These early childhood instructors taped interviews about their views about using PBL to teach diverse learners. Four of the seven teachers stated that PBL increased their ability to include different learners in the classroom. Diverse learners in this study could include: children with behavior issues, children from at-risk environments, and children with special needs. Four of the interviewed instructors claimed that the *Project Approach* increased motivation and attention span of diverse learners. As a result of student

motivation, children were more self-directed and more task-oriented to complete work. They were also more eager to discuss high interest topics such as “buses” of which they might have some prior knowledge. Another positive finding was that teachers began to bring realia, real objects related to the project topic into the classroom (objects from children’s homes as well as tools) that children would recognize. Children sprang into conversations about familiar objects. In conclusion, there was discussion about effective professional development for teachers who did not have the opportunity to participate in this project.

Other researchers identified the specific teacher skills involved in PBL. Duncan and Tseng (2010) identified effective classroom management skills, solid content knowledge, goal-setting experience, willingness to support students, and an encouraging approach to interactions with students. These skills are not necessarily germane to PBL, but classroom teaching skills needed in all classrooms. Ninth-grade students who participated in the study demonstrated overall gains. Beneke & Ostrosky (2009) and Hertzog (2007) stated that teacher resistance can be a limiting factor in the overall success of PBL.

Kim and Crasco (2006) followed a 1990 science PBL effort. Although the authors discussed the outcomes as they addressed the achievement gap for minorities, they did not discuss the issues of culturally and linguistically diverse learners as part of the issues of the large sample. This study was a 4-year investigation of 13 culturally and linguistically diverse elementary schools implementing comprehensive school reform. The results were significant regarding English language learners. Students from the CSR

schools in the study performed as well as those students from matched comparison schools. In some schools, LEP students and their English-speaking peers from CSR schools outperformed their comparison school counterparts.

All these studies point to the issue of the length of time that it takes to acquire English, or at least academic English. Thomas and Collier's (2002) decisive study of programs across a 25-year period is the longitudinal study which addresses this issue.

Summary

Although most CSR developers claim to respect diverse cultures, no models appear to have been specifically developed for multicultural, multilingual contexts. As Hamann et al. (2002) argued, the lack of attention to LEP students in the CSR movement is not astonishing, but rather indicative of the last 30 years. The needs of migrant, ELLs, and other learner groups have not been developed as sources for CSR models.

Although most schools studied qualified for comprehensive school reform project monies due to their free and reduced lunch percentage, most of the literature reviews do not investigate the culturally and linguistically diverse characteristics of learners as the central topic. Studies discuss various disciplines and the impact comprehensive school reform projects have on student achievement in science (Geier, Blumenfeld, Marx, Krajcik, Fishman, Soloway, et al., 2008) and socio-economic levels (Ross & Lowther, 2003).

If student achievement is one of the key measurable outcomes for ELLs, then more emphasis needs to be placed on how these ELLs can achieve. The research agenda in regard to the variables that affect elementary LEP student achievement needs

to be expanded. The few existing studies in PBL and student achievement demonstrated mixed results and failed to rule out the effects of other variables.

CHAPTER III

METHODOLOGY

In this chapter I outline the methodological design of the study. It includes a description of the population, context of the study, instrumentation, data collection, and data analysis.

Description of the Population

This study took place in a large urban school district in southeast Texas. In January 2000, the urban school district in the study was the largest school district in the state and the seventh largest in the United States, educating more than 217,000 students in 288 schools and programs. The administrative sub-district, one of 13 in this large urban school district, consisted of 25 elementary, middle, and high schools. Demographic data for these schools revealed a makeup of 92% Hispanic, 5% Anglo, 3% African American, and less than 1% other ethnicities. Seven elementary campuses collectively enrolled 3,110 students, 55% of whom were LEP. The identification process used in the district at the time was the Language Assessment Scales (LAS). A student designated as LEP is one whose parents or guardians indicate that a language other than English is spoken in the home. From kindergarten to first grade, students are designated as LEP if they score at or below Level III on the LAS. These data were used to determine baseline or entry level language proficiency of students. Students entering the district from second to twelfth grade were LEP if they did one or more of the following: 1) scored at or below Level III on the LAS, 2) scored below the 40th percentile in total

reading or total language subtests on a standardized achievement test, or 3) received a non-passing score on the state-mandated criterion-referenced Texas Assessment of Academic Skills (TAAS) (Texas Education Agency, 2000).

Context of the Study

Context with Treatment

This Title VII comprehensive reform grant in Hope ISD included seven elementary schools all located in an Empowerment Zone in a historical community near a downtown area. All schools received school-wide Title I funds and served a predominantly Hispanic population. Although seven campuses participated, two schools were not included in the longitudinal data: Treatment School #6 was closed in 2000, and Treatment School #7 did not participate over the length of the study. The remaining five schools will form the study group. The district had a population of 210,000 students in 2001, with 67,000 LEP students. The district was divided into 13 administrative sub-districts, each with a district superintendent as well as complete staff and offices.

Four participating campuses implemented the Traditional Model, called Transitional until 2004, when the name was changed at the urging of the Texas Education Agency. The goals of the Traditional Bilingual Program (TBP) are for students to: 1) achieve fluency in their daily communication as well as academic endeavors in their native language, 2) reach high levels of academic achievement in all subject areas in their native language, 3) make progress in English proficiency, 4) transport concepts and skills into the target language (English), and 5) transfer

effectively into an all-English curriculum. This is a model whereby limited English proficient students receive native language instruction for concept development while acquiring English. Students receive instruction primarily in their native languages in grades PK-3 while they receive gradual increments of daily English instruction. Based on a criteria of success in the native language and demonstrated success appropriate in English, students are then "transitioned" into English reading and other core subjects (Multilingual Programs Department, HISD, 2005).

It is expected that most LEP students in a TBP shall qualify for the transition (now termed Pre-Exit phase of the program) by the end of Grade 3, if the suggested guidelines have been implemented since PK or K. These students should be able to transition and succeed in the mostly-English curriculum in the transition phase at Grade 4, but only if the appropriate program was implemented in the Grades PK-3 ESL time of the instructional day. Students who enter the program later, usually due to mobility or immigration, may need additional time and support to reach the transition phase of the program. Upon meeting requirements, the students are transferred into an all-English curriculum (Multilingual Programs Department, HISD, 2005).

The fifth school embraced a 90-10 two-way dual language model. Students who are fluent English speaking and fluent Spanish speaking all attend the same campus. Students and parents make a commitment by signing a contract to remain with the program throughout the elementary years. A pre-K program was added through a federal enhancement grant to provide intensive Spanish development for students entering the program. The goal of this program was for all students on the campus to become

bilingual/biliterate. Students who desire to acquire more bilingual skills can continue to study at the feeder campuses which provide instruction through Grade 12. This study will focus on Hispanic English language learners on elementary campuses. Table 2 lists the number of LEP students enrolled in the treatment campuses.

Table 2: Number of Students Enrolled in Treatment Group (TG) Campuses (2000-2001)

TG School	*Enrollment*	*# LEP*	*%LEP*
1	610	363	59. 5
2	380	252	66. 3
3	352	145	41. 2
4	398	209	62. 6
5	419	203	49. 8
Total	**2,159**	**1,172**	***57. 1**

*Note: * Weighted average*

Campus Profiles

Table 3 offers additional information about student demographics and additional information about programs.

Table 3: Treatment Group (TG) Campus Profiles Summary Table

	*Percentage of Students**					
Campus	*Native Am*	*African Am.*	*Asian*	*Hispanic*	*Anglo*	*Bilingual Program*
(TG-1)	0	1	0. 7	97. 4	1. 6	Traditional
(TG-2)	0	1. 8	0. 3	96. 8	1. 1	Traditional
(TG-3)	0. 3	4. 3	0. 5	86. 6	8. 5	Traditional
(TG-4)	0	0. 4	0. 5	96	2. 5	Traditional
(TG-5)	0	1. 0	0	93. 8	5. 2	Two-Way

*Note: * Academic Excellence Indicator System (AEIS) 2000-2001, Texas Education Agency*

Context of Comparison Groups

The schools in the two comparison groups were determined by similar demographics within a range of 47% to 69% LEP population, as provided through the 5-year average percentage of student LEP population through the 2000-2005 AEIS reports from the Texas Education Agency. All Texas districts, including urban districts as well as small districts, were examined to locate schools within the project urban school district as well as those in the state of Texas. None of the comparison schools participated in the Techno-learning project. Table 4 presents the demographic information for the state comparison schools employed in the study. Data were used to compare language proficiency on the RPTE as well as AEIS factors which could possibly provide comparison of variables which may affect results.

Table 4: Statewide Comparison (SC) Schools*

Campus	*Total*	*LEP*	*% LEP*
SC1	417	207	49. 6
SC2	463	273	58. 9
SC3	453	248	54. 7
SC4	479	235	49. 1
SC5	514	251	48. 9
SC6	410	214	52. 3
SC7	512	284	55. 5

Note: *Academic Excellence Indicator System (AEIS) Texas Education Agency

The second comparison group included four district campuses that did not participate in the Techno-learning project, but did complete either the Stanford or Aprenda assessment. Comparison schools adopted the same district and state guidelines for determination of participation in the Spanish or English norm-referenced testing. I compared student performance between treatment and non-treatment participants in Total Reading, Total Math, and Total Language. Table 5 shows the list of enrollment in District Comparison schools.

Table 5: District Comparison (DC) Schools (2001-2005)

School	*Enrollment*	*#LEP*	*%LEP*
DC1	517	254	49. 2
DC2	536	281	52. 5
DC3	378	205	54. 1
DC4	357	173	48. 5

For Question 1, I will use the data from the Stanford Achievement test administered during Spring Administration for students in Grades 4 and 5 bilingual/ESL programs in years 2001-2005, the treatment years of the project. Table 6 shows a list of those students who participated in the Stanford testing during the treatment years.

Table 6: Total Number of LEP Students in Treatment Group Participating in the Stanford Achievement Test* in 2001-2005, by Grade Level

Grade	*01-02*	*02-03*	*03-04*	*04-05*
5	14	40	48	70
4	16	41	46	59
3	45	42	37	29
2	25	16	20	0
1	23	45	26	18
Total	123	184	177	176

*Note: *Total Reading, Total Math, Total Language*

According to TAC Chapter 89 (Texas Administrative Code, 2002), bilingual/ESL education students may exit the bilingual/ESL program only at the end of Grade 1. Each campus LPAC committee determines which assessments are given based on the language of instruction. As students' English proficiency advances, students receive more English instruction in their programs. The Stanford may be given as a measure of English academic proficiency to meet criteria of transition into more classes in English or to exit into all-English instruction. These students would be monitored for adequate academic progress for two years. Students usually participate in either the Aprenda *or* Stanford.

To examine progress in Spanish for Question 2, I collected normal curve equivalency NCE scores for the treatment years 2001-2002 through 2004-2005. The students who were receiving reading instruction in Spanish participated in the Aprenda assessment. Table 7 lists the number of students that completed the Aprenda assessment in Grades 1-5 during the spring norming period designated by the district.

Table 7: Number of Students in Treatment Group by Grade Level and Campus which Completed the Aprenda

Grade	*2001-2002*	*2002-2003*	*2003-2004*	*2004-2005*
5	16	14	8	13
4	48	15	5	9
3	101	61	47	74
2	140	160	89	122
1	140	132	133	207
Total	445	382	282	425

Following the pattern of Spanish instruction in the bilingual program, students at Grades 1, 2, and 3 participated in greater numbers in the Aprenda testing. The number of participants declined as students moved into Grades 4 and 5. The data represent the number of participants at five treatment campuses.

Data from the District Comparison campuses were examined to compare progress between the two groups. Table 8 represents the number of participants in the Aprenda from District Comparison campuses.

Table 8: Number of Students in District Comparison Group by Grade Level and Campus which Completed the Aprenda

Grade	*2001-2002*	*2002-2003*	*2003-2004*	*2004-2005*
5	28	16	10	0
4	34	23	65	80
3	82	106	104	104
2	83	90	109	113
1	121	108	122	124
Total	348	343	410	421

Participation is largest at Grade 1, 2, and 3. Participation in the Spanish assessment declines at Grades 4 and 5 as program participants may be exiting the program or moving into all-English instruction according to the curriculum guidelines of the district.

Instruments

Stanford 10

The Stanford Achievement Test Series is a standardized battery of tests designed to measure student achievement from kindergarten through Grade 12 in the English language. The assessment which will be used in this study will be the Stanford Achievement Test (SESAT) which extends from the second half of first grade to ninth grade. The SESAT has sections that test the ability to decode words and comprehend brief text passages, understand numbers and employ them to do simple arithmetic, select

correctly spelled words, identify grammatical sentence components, demonstrate basic cultural knowledge, and listen effectively. Most items have three responses, and 10 sittings are needed for students to complete all of the subtests which range from 25-45 minutes. This test does not have time constraints.

The Stanford Achievement Test adds the content areas of science and social studies as well as an emphasis on research and study skills. These tests were not consistently administered in the district; therefore, they are not included in this investigation. The Stanford tests in the district are scored by machine.

Validity of the Stanford is presented through various measures. The Stanford Index of Instructional Objectives demonstrates a progression of difficulty and thus provides a measure of criterion-related validity evidence. In addition, the technical manual presents the means of p-values for every subtest and total at each level. These values demonstrate that the subtests are more difficult for students in the fall of the year, at the beginning of the instructional sequence, and easier in the spring (Buros, Volume 14). The means and standard deviations in terms of scaled scores for each subtest and total for fall and spring standardization samples demonstrate the relevance of Stanford to the instructional sequence as they grow from the fall to spring of the same school year.

To establish reliability, the Kuder-Richardson Formula #20 reliability coefficients and standard errors of measurement are documented for all clusters in Stanford as well as subtests and totals. (Harcourt Brace, 1996). The KR#20 coefficients for the full-length test (A and B) show the majority of them to be in the mid-0.80s to 0.90s, which are satisfactory for the purposes of this test. Composite scores, such as

"Total Reading" and "Total Mathematics" were close to 0.90 in general. (Harcourt, 1996). The Normal Curve Equivalents (NCEs) will be used as data for this study. One of the advantages for using this scale is that the NCEs provide an equal-interval scale (Gottlieb, 2006). The NCE scores of 1, 50, and 99 can be used as a norm-reference score, can be used in computations with scaled scores, and comprise smaller units than stanines.

Aprenda

Aprenda: La Prueba de Logros en Español, Segunda Edición (Harcourt Brace, n.d.) assesses Spanish-speaking students' school achievement in reading, language arts, and mathematics. It provides information from which decisions for improving instruction can be made. This second edition provides updated content that reflects the current national "consensus" curriculum and modern educational trends. Aprenda consists of eight levels to assess students from kindergarten through Grade 12. This second edition was planned to mirror the content and processes measured by the Stanford Achievement Test Series, Ninth Edition (TC019829-TC019841). The district does not administer the open-ended sections available in Grades 1-5. The *preprimario* level is for use with students in kindergarten and Grade 1. The content areas covered are: *sonidos y letras* (sounds and letters), *lectura de palabras* (word reading), *lectura de oraciones* (sentence reading), *matemáticas* (mathematics), and *palabras y cuentos* (listening to words and stories).

The *primario 1* level is for use with students in Grades 1 and 2. The content areas covered are: *lectura de palabras* (word reading), *comprensión de lectura* (reading

comprehension), *matemáticas: resolución de problemas* (mathematics: problem solving), *matemáticas: procedimientos* (mathematics: procedures), *lenguaje* (language), and *comprensión auditiva* (listening).

The *primario 2* level is for use with students in Grades 2 and 3. The content areas covered are: *vocabulario* (reading vocabulary) / *comprensión de lectura* (reading comprehension), *matemáticas: resolución de problemas* (mathematics: problem solving), *matemáticas: procedimientos* (mathematics: procedures), *lenguaje* (language), and *comprensión auditiva* (listening).

The *primario 3* level is for use with students in Grades 3 and 4, and the *intermedio 1* level is used for students in Grades 4 and 5. Both levels of tests cover the following content areas: *vocabulario* (reading vocabulary) / *comprensión de lectura* (reading comprehension), *matemáticas: resolución de problemas* (mathematics: problem solving), *matemáticas: procedimientos* (mathematics: procedures), *lenguaje* (language), and *comprensión auditiva* (listening). Both levels have open-ended tests in reading, writing, and mathematics which are not administered in the district. For purposes of this investigation, scores from Grades 1 through 3 reading, mathematics and language clusters in the Spring Administration are extracted for analysis.

To establish reliability, the Kuder-Richardson Formula #21 reliability coefficients and standard errors of measurement are documented for all clusters in Aprenda, as well as subtests and totals. The KR#21 estimates provide a measure of the lower bounds of the test's internal consistency: Reading Clusters: Grade 1, 0.89-0.94, Grade 2, 0.88-0.90, and Grade 3, 0.87-0.89.

The *Aprenda Index of Instructional Objectives* demonstrates a progression of difficulty and thus provides a measure of criterion-related validity evidence. In addition, the technical manual presents the means of p-values for every subtest and total at each level. These values demonstrate that the subtests are more difficult for students in the fall of the year, at the beginning of the instructional sequence, and easier in the spring (Harcourt Assessment, Inc.). The means and standard deviations in terms of scaled scores for each subtest and total for fall and spring standardization samples demonstrate the relevance of *Aprenda* to the instructional sequence as they grow from the fall to spring of the same school year.

Aprenda scores were obtained from each school participant in the areas of Total Reading, Total Math, and Total Language in Spanish in Grades 1-3. According to its publishers (Harcourt Brace, Educational Measurement, & Psychological Corporation, respectively), the tests reflect the current national consensus curriculum for bilingual programs. Scores are reported on NCEs with corresponding national percentile ranks. One of the advantages for using this scale is that the NCEs provide an equal-interval scale (Gottlieb, 2006). Both batteries provide profiles of scores on individual subtests or in the major academic areas of reading and mathematics. An advantage of such batteries is that they may permit horizontal or vertical comparisons, or both. Thus, a student's relative standing in different subject matter areas can be compared in terms of a uniform normative sample. The student's progress from grade to grade can be reported in terms of a single score scale. A percentile indicates the student's relative position in the standardization sample nationally.

Validity of the *Aprenda* is presented through various measures. The *Aprenda* Stanford *Index of Instructional Objectives* demonstrates a progression of difficulty and thus provides a measure of criterion-related validity evidence. In addition, the technical manual presents the means of these p-values for every subtest and total at each level. These values demonstrate that the subtests are more difficult for students in the fall of the year, at the beginning of the instructional sequence, and easier in the spring (Technical Data Report, *Aprenda*, p. 36) (The Psychological Corporation, 1991). Construct validity is presented in the form of correlations between subtests at adjacent levels. These correlations ranged from 0.36 to 0.89. To support criterion-related validity, correlations between corresponding subtests and totals for *Aprenda 2* and *Aprenda 1* were sought. These correlations ranged from 0.54 to 0.91.

Texas Reading Proficiency Test in English (RPTE)

The Texas Education Agency (TEA) mandates the use of the Texas Reading Proficiency Test in English as a measure of English language development. To investigate Research Question 3 of the study, the RPTE was used to evaluate the annual growth for all LEP students in the five participant schools as well as comparison schools in the district and in the state. The RPTE was field tested and implemented in spring 2000. This assessment was designed to measure the growth in the English reading proficiency of second language learners annually.

The RPTE test results provide a measure of progress, indicating annually where each LEP student is on a continuum of English language development, designed for second language learners. This continuum is divided into three proficiency levels:

beginning, intermediate, and Advanced/Advanced High. RPTE test results include two major kinds of scores: a proficiency rating and a scale score. These scores are used to indicate the current reading levels of students as well as their annual improvement. Students are required to take the RPTE until they are reclassified as non-LEP through the state exit criteria. Campuses are held accountable for the percentage of progress that students at the campus attain. Whole school percentages are available through the Academic Excellence Indicator System reports which are provided each year.

Student performance data from RPTE results will be reported as the percentage of students ending the year at a specific level, either the same or different from the level at which they began. For example, performance data would report the percentage of Intermediate students which either remained at the Intermediate level or transitioned to the Advanced/Advanced High level at the end of the year.

Academic Excellence Indicator System (AEIS)

The Academic Excellence Indicator System gathers performance data of students in each school and district in Texas each year. This collected information is compiled into yearly AEIS reports. It was developed after House Bill 72 called for an accountability measure based on student performance.

The first year of the AEIS reports was 1990-1991. Since that time, it has evolved through legislation, suggestions of the advisory committees and the commissioner of education, as well as through final development by researchers and analysts from the Texas Education Agency. Federal legislation has comprised an important influence in this form of accountability data.

These reports provide information that may be of use in the analysis of school improvement. Performance indicators that may be of use in this study are: 1) teacher experience, 2) percent of LEP, 3) student/teacher ratio, 3) years of teaching experience, 4) campus mobility rate, 5) results of the RPTE, and 6) attendance rates.

Description of the Intervention

The large urban school district in the study received a 5-year Title VII comprehensive school grant in September 2000. This award included seven elementary schools all located in an Empowerment Zone in a historical community near the down-town area. All seven schools received school-wide Title I funds (free and reduced lunch funds) for low socio-economic schools, and served a predominantly Hispanic population. The goals of the grant are described in Figure 1 and discussed following the figure.

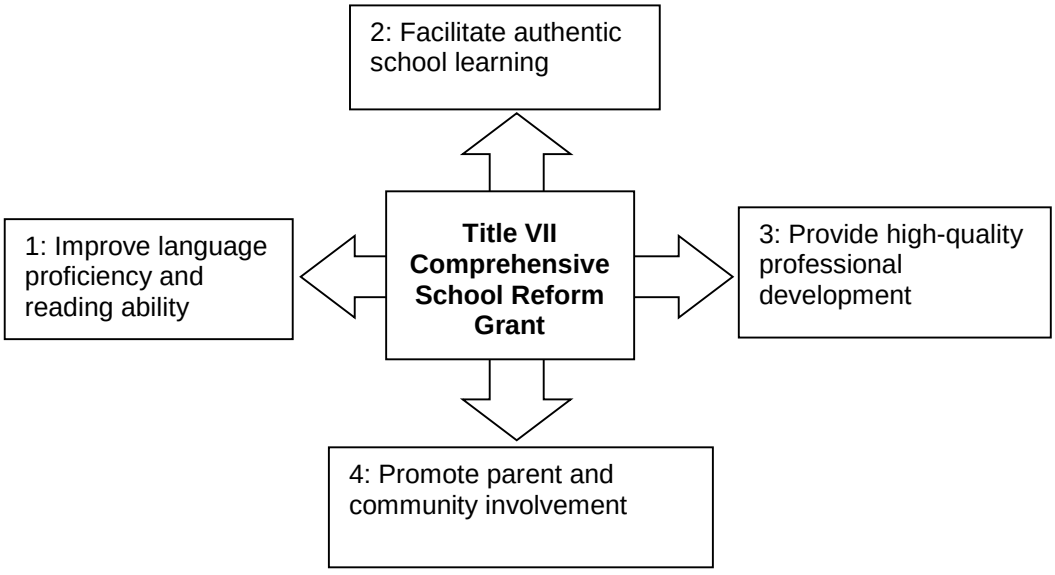

Figure 1: Goals of Title VII Comprehensive School Reform Grant

The goals of this grant were:

Goal 1: Improve student reading ability and language proficiency.

Goal 2: Integrate and align the Learning Community curriculum, instruction, technology, professional development, and parental involvement to facilitate authentic student learning.

Goal 3: Provide high-quality and continuous teacher professional development and training.

Goal 4: Provide meaningful involvement of parents and the local community into the instructional process.

Goal 1: Improve Reading Ability and Language Proficiency

There is evidence that initial reading instruction in a child's home language will lead to literacy attainment in the home language as well as the target language (Cummins, 1978, 1994; Snow, Burns, & Griffin, 1998). The whole-school professional development sought to reform language acquisition by providing students with relevant reasons to read, process language, and communicate orally and through written text (PODER, 2000). This approach differs from more traditional methods of language acquisition that focus on translation, repetition, drill, and rote memory. Both Spanish-speaking and English-speaking students learned content through inquiry and project-based learning.

The Techno-learning intervention placed emphasis in Grades PK-3 in language development in BICS and CALP (Cummins, 1981a, 1981b). Technology was integrated into the curriculum to offer students the opportunity to investigate new topics of interest

in Spanish or English. They communicated with other learning communities via their network/website provided by an outside provider.

The instructional conversation (Goldenberg, 1991) was restructured to reflect a student-centered focus. The predictable pattern of teacher-student interaction (Cazden, 1988; Goodlad ,1984; Lemke, 1990) was abandoned for a more interactive student-student classroom where students had opportunities to surpass supplying correct answers to a teacher's questions and start developing competence in areas of critical thinking and intellectual discourse-proposing, recommending, explaining, analyzing, questioning, predicting, directing, and evaluating. Students developed academic language when they negotiated meaning with their peers.

Students used cutting-edge instructional materials in their native language as well as in the second language. By developing critical conversations in the first language (L1) students reached a high level of cognitive development that they could transfer into their second language (L2) (Cummins, 1994; Krashen, 1994).

Literacy development in a child's early years provides the means by which students can become quite independent in their first language. By focusing on the early years of learning, instruction establishes a foundation in the primary language—which actually enhances development of English. The goal is to read independently and on-level by the end of third grade. This can positively affect achievement in later upper elementary grades. Students who did not achieve grade-level expectations in English literacy were offered tutorials.

Students establish a basis for "reading to learn" in the upper grades—Grades 3, 4, and 5—where academic reading is so critical to school success (Snow, Burns, & Griffin, 1998). In addition, students develop literacy skills in the second language (English) as soon as they have a foundation in the primary language. The percentage of language allotment for primary and second language instruction in bilingual and dual language programs in the study district can be reviewed in Appendix A.

Goal 2: Facilitate Authentic, High-Quality Learning

Techno-learning focused on the school-wide implementation of project-based learning. Variously called "project-based learning," "authentic pedagogy" (Newmann, Marks, & Gamoran, 1996), "situated learning" (Lave and Wenger, 1991), and "cognitive apprenticeship" (Collins, Brown, & Newman, 1989), these models of education have a common focus on learning by doing, using the teacher as a coach/facilitator, and altering traditional divisions among disciplines and between the school and the community. Project-based learning activities restructure the existing instructional program by heightening the reasoning processes and fomenting critical thinking skills that accelerate language acquisition in the LEP population. Students participate in inquiry-based projects that are challenging and encourage them to develop a better understanding in their native language. As they learn in their native language, students are developing the second language.

Authentic instruction forms a foundation for reading for LEP students built on personal experiences and develops vocabulary in a meaningful context. Vocabulary development is heightened through depth, not just through frequent exposure (Allen,

1999; Beck, McKeown, & Kucan, 2002; Blascowicz, 1996; Zwiers, 2008). Many projects can require between 3-6 weeks for completion, thus providing multiple extended opportunities to develop vocabulary in depth. When connections are made across languages (L1 and L2) as well as across disciplines, students develop a firm foundation not only in language but in content as well (Cummins, 1980). This process, of course, necessitates consistent, high-quality staff development and support. Teachers must make commitments to design and implement project-based learning modules each year.

Goal 3: High-Quality Professional Development

Capacity building of all teachers, including bilingual/ESL, was a major initiative of the funding. An important component of the treatment was establishment of campus leadership teams as well as a Leadership Development Team (LDT) for the smaller learning community that included a group of administrators, site facilitators, project administrator, outside evaluator, and professional development consultants. For the consistency of the project, it was crucial to have curriculum in alignment with project goals, from teachers as well as administrators. A sample of a campus development plan can be viewed in Appendix B: Sample Annual Performance Report. The campus leadership committee met and rated their progress toward each yearly goal of the program based on the five benchmarks: 1) shared accountability, 2) project-based learning, 3) comprehensive assessment for continuous improvement, 4) team-based school organization, and 5) sensible use of technology.

Administrators from participant schools attended training in project-based learning and school reform. Teachers selected professional development from a variety of nationally recognized sessions such as project- and problem-based learning, integrating technology into lesson design, and types of alternative assessment. Teachers were committed to 12 hours of staff development per year. All teachers were encouraged to take leadership roles in the selection, presentation, and evaluation of staff development by serving on the campus leadership teams as well as the project leadership team (PODER, 2000). The school facilitators and project director participated in an intensive 5-day training session per year consisting of sessions in project instructional strategies.

Goal 4: Meaningful Involvement of Parents and the Local Community in the Instructional Process

Under Goal 4, five sub-goals were further delineated for the parents and community: a) provide meaningful exchange between parents in and out of the classroom, b) provide students with rigorous content, c) engage Spanish-speaking students with their English-speaking peers, d) provide intense staff development to elicit community collaboration to implement project-based learning that integrated curriculum, and e) implement innovative instructional strategies including cooperative learning, active learning, experiential instructional strategies, and technology integration.

Research Questions

The research design will answer the following three questions about the impact of the Techno-learning project:

- Research Question 1: What is the impact of 4-year whole-school reform on Hispanic ELL students' academic achievement in reading in English, math in English, and English language arts by grade level?
- Research Question 2: What is the impact of 4-year whole-school reform on Hispanic ELL students' academic achievement in reading in Spanish, math in Spanish, and Spanish language arts by grade level?
- Research Question 3: How did a 4-year whole-school reform impact school-level English proficiency?

Data Analysis

The study was conducted in a school district in an Empowerment Zone in the southwest area of the country. The permission to conduct the study from the school district and the human subjects approval form from the Institutional Review Board at Texas A&M University are shown in Appendix C.

To answer the first research question, causal comparative statistical analysis techniques were used in a group experimental design of treatment and control schools using student performance in literacy-oriented assessments as the measurement mechanisms. Performance assessment data for reading, math, and language in English were used as data availability allowed. Other subject areas such as listening and thinking skills were not tested consistently; therefore, they were not included in this study.

Students' normal curve equivalent (NCE) scores were collected from Grades 1-5, which were the grade levels of administration. Mixed repeated measures of analysis of variance (ANOVA) significance testing were conducted to explain changes between groups as well as within subjects. The intervention was the Techno-learning project. Schools employing the Techno-learning project were the treatment group; schools without were the control group. Comparison schools were determined through demographically matching size, program, and an average of percentage of LEP population in a range of 47-69%. All schools in the study were geographically located within Texas. Data from the Stanford performance assessments were used for treatment versus non-treatment analyses.

Student performance data were represented by NCE scores reported for all students at all of the schools at Grades 4-5, or earlier grade levels as significant changes were identified. There was not significant student continuance in student performance scores for the 4-year period of the treatment, due to the program design. There were 23 students identified in a 2-year cohort during 2002-2003 and 2003-2004. This was a matched cohort of students at treatment and control campuses.

A mixed repeated measure analysis of variance was conducted using SPSS 21 to determine the changes between groups in student performance as well as within subject analysis. Student performance data from only the Stanford assessment from the district comparison group and the treatment group were used for analyses due to the unavailability of such information for schools outside the treatment group district.

To ensure homogeneous group comparisons, schools with overall student and percentage of LEP student populations similar to the relative means of the corresponding demographics were identified and used as non-treatment schools. Schools with student and LEP enrollments within the standard deviations of the student and LEP enrollment population means of the treatment schools were selected for comparative statistical analyses. Limited English Proficiency is in itself a determinant of at-risk students, a term used by the Texas Education Agency to identify students at risk of dropping out of school. Thus, the study focused exclusively on Hispanic LEP students.

To answer the second research question, causal comparative statistical analysis techniques were used in a group experimental design of treatment and non-treatment schools using student performance in Spanish literacy-oriented assessments as the measurement mechanisms.

Performance assessment data for reading, math, and language in Spanish from the *Aprenda* assessment were used as data availability allowed. Students' NCE scores were collected from Grades 1-5, which were the grade levels of administration. A mixed repeated measure analysis of variance significance testing was conducted using SPSS 21 to analyze between subjects as well as the relationship of time and the effect on the intervention. Schools employing the Techno-learning project were the treatment group; schools without were the control group. Comparison schools were determined through demographically matching size, program, and an average of percentage of LEP population in a range of 47-69%. All schools in the study were geographically located

within Texas. Data from the *Aprenda* performance assessments were used for treatment versus non-treatment analyses.

Student performance data on *Aprenda* was represented by the NCEs reported for all students at all of the schools at Grades 1-3, as Spanish was the language of instruction following the district guidelines. No students in special education programs were included in the data set. The number of individual school data points, then, determined the size of the statistical population (N). A matched cohort of 225 students from both treatment and control group schools was determined as the study group for statistical analyses. Data from 2000-2001, 2001-2002, and 2002-2003 were used in the statistical analysis.

A single group experimental design was conducted on the treatment group to investigate any changes in student performance during the testing period, again employing causal comparative statistical analysis using student performance in Spanish literacy-oriented assessments as the measurement mechanisms. Student performance data from only the district comparison campuses and treatment group were used for analyses due to the unavailability of such information for schools outside the treatment group district.

To ensure homogeneous group comparisons, schools with overall student and percentage of LEP student populations similar to the relative means of the corresponding demographics were identified and used as control schools. Schools with student and LEP enrollments within the standard deviations of the student and LEP enrollment population means of the treatment schools were selected for comparative statistical analyses.

Limited English Proficiency is in itself a determinant of at-risk, a term used by the Texas Education Agency to identify students at risk of dropping out of school. Thus, the study focused exclusively on Hispanic LEP students.

To respond to Research Question 3, data from the RPTE for treatment versus district comparison schools were examined using a mixed repeated measure analysis of variance analysis of variance using SPSS 21. I focused on one data level from RPTE, Advanced/Advanced High proficiency levels by percent. The goal of the state ESL program is that students advance at least one proficiency level each year, reaching the proficiency rank of Advanced/Advanced High in a 3-year window. For example, the RPTE uses three basic levels, Beginning, Intermediate, Advanced/Advanced High, whereby a student transitions from one level to the next yearly, until ideally performance should correlate to non-LEP student performances. Scale scores for individual students were not available; therefore, the percentages of student English proficiency levels as a campus will serve as data points at the treatment and control group campuses for a mixed ANOVA analysis. State-level data from the 12 district comparison schools will provide further information, as the schools are compared to this state-level assessment.

Summary

Chapter III presented a comprehensive description of the research design, data collection, analysis objectives, and methods to answer three research questions relating to the impact of the Techno-learning project. Causal comparative statistical analysis techniques were used in a group experimental design of treatment and non-treatment schools using student performance in standardized assessments in Spanish and English. In future chapters, RPTE results will be discussed by campus as compared to matched campuses at the district and state levels.

CHAPTER IV

RESULTS

The primary goal of this investigation was to determine the impact of student academic achievement and academic literacy development of the school-wide interventions from 2001-2005 in this comprehensive school-wide reform project.

The study utilized two norm-reference assessments, Aprenda (Spanish) and Stanford 9 and 10 (English), as well as the results of the RPTE, a state-devised language assessment approved by the federal government, as reported by the AEIS. The AEIS was employed to evaluate school demographics for valid comparisons to be drawn between treatment and non-treatment schools.

Research Question Results

Research Question 1: What is the impact of a 4-year whole-school reform on Hispanic ELL students' achievement in reading in English, math in English, and English language arts by grade level?

To answer the first research question, a mixed between-within subjects analysis of covariance (Mixed ANOVA) was conducted to examine the impact of instructional intervention (Techno-learning) on students' English performance in reading, math, and language across two time points. There was not significant student continuance in student performance scores for the 4-year period, due to the program design (see Appendix A). There was a large attrition rate in participation in Stanford testing.

Students could exit at the end of first, second, or third grade, based on a score of 40 percentile or higher on the Stanford language section. Students who exited were not required to participate in the Stanford assessment. The average mobility rate of the treatment groups was 16.6% and the control group was 18.9%. This may have also contributed to the attrition. There were 23 students identified in a 2-year cohort of 2002-2003 and 2003-2004. This was a matched cohort of students at treatment and control campuses.

Table 9 provides the overall and group means, standard deviations, and sample size for each dependent variable.

Table 9: Descriptive Statistics of Stanford Reading Means of Students in Treatment and Comparison Schools

	Treatment/Comparison		Mean	Std. Deviation	N
Read NCE Grade 4	0*		282.50	60.498	16
	1		308.86	82.501	7
		Total	289.83	67.212	23
Read NCE Grade 5	0		387.44	92.729	16
	1		378.14	79.378	7
		Total	384.61	87.179	23

*Control group coded as 0 in SPSS

There are three assumptions which are important to a robust statistical analysis of the mixed between-within subjects analysis of variance (Mixed ANOVA). In social sciences, scores on the dependent variable, i.e., Aprenda and/or Stanford, may not be normally distributed. Box's Test is conducted to determine if the groups have equal distribution. Levene's test will be employed to verify that there is homogeneity in variance in the two groups. The sphericity assumption requires that the variance of the population difference scores for any two conditions is the same as the variance of the population difference scores for any other two conditions (Pallant, 2010). This assumption is commonly violated, and other alternatives (corrections) such as the Greenhouse-Geisser are suggested.

In the Stanford reading analysis, the Box text result was p=.689 (which was larger than p=.05). Therefore, the assumption was not violated. Levene's test of homogeneity of variance was conducted on the two reading outcome variables. Both the p values were greater than .05 (p=.204 and p=.751) which indicated that the variances were all equal. The assumption of homogeneity of variance was met. Mauchly's test indicated that the assumption of sphericity had been violated, x^2 (2) =28.098, $p < .001$. Therefore, the null hypothesis was rejected and the alternative hypothesis that the variances of the difference outcomes were not equal was accepted. When the assumption was violated, Greenhouse-Geisser correction was used, according to Pallant (2010).

There was no statistically significant interaction effect on Stanford reading performance [F(1,21)=.774, p=.389, partial η^2=.036]. There was a main effect of time [F (1, 21) =17.685, p<.001, partial η^2=.457]. This value suggests a large effect size.

There was not a statistically significant effect of the intervention [F (1,397.179)=.096, p=.760, partial ŋ²=.005]. The effect size of .005 is also quite small.

The treatment group had higher mean scores in reading than the comparison group in fourth grade. In fifth grade, the control group exceeded the treatment group in Stanford Mean reading scores, increasing the control group scores by over 100 points (see Figure 2 and Table 9).

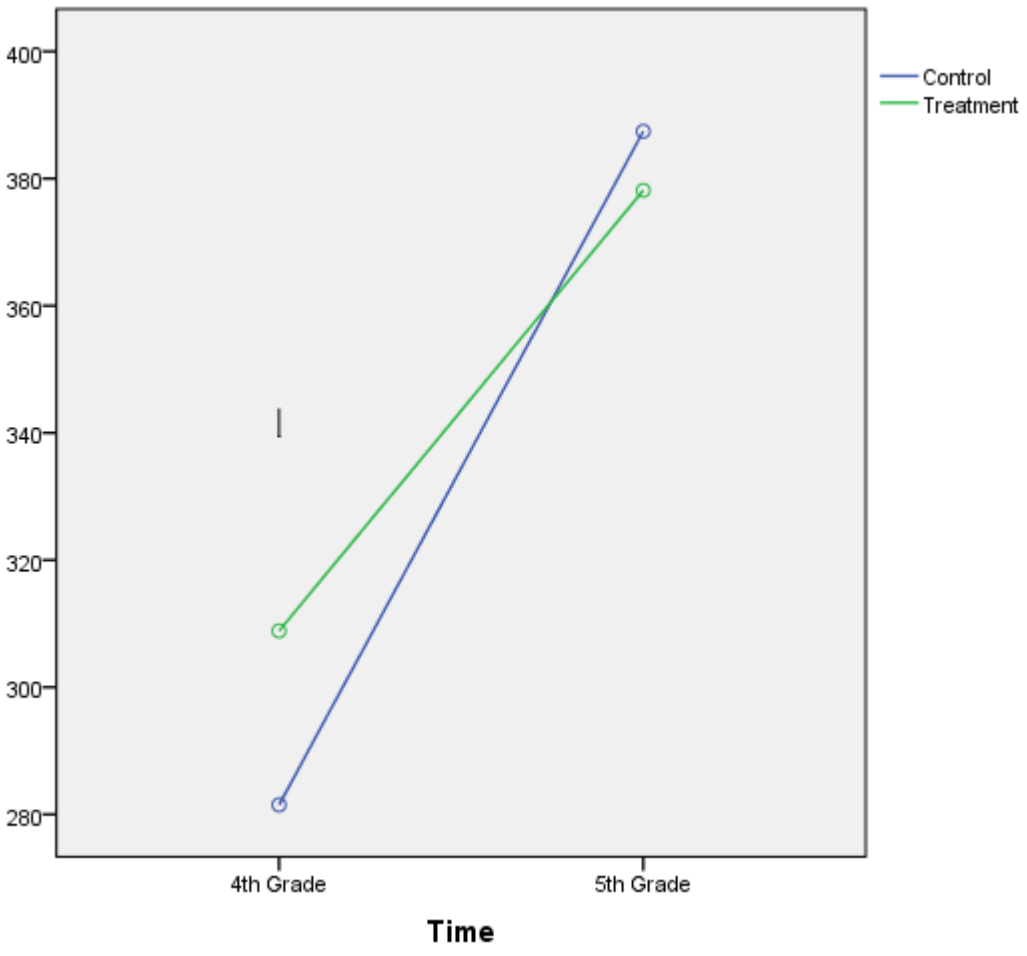

Figure 2: Comparison of Stanford Reading Means (NCEs) between Treatment Group and Control Group across 4th and 5th Grades

Table 10: Descriptive Statistics of Stanford Math Means of Students in Treatment and Comparison Schools

	Treatment/Comparison		Mean	Std. Deviation	N
Math NCE Grade 4	0*		401.9375	109.51862	16
	1		432.8571	155.22932	7
		Total	411.3478	122.31614	23
Math NCE Grade 5	0		435.8125	103.06388	16
	1		449.2857	188.97065	7
		Total	439.9130	130.46696	23

*Control group coded as 0 in SPSS

There was homogeneity of covariance matrices as assessed by Box's test of equality of covariance matrices (p=.375) which was larger than .05. Therefore, the assumption was not violated. Levene's test of homogeneity of variance was conducted on the two math outcome variables. One of the p values was not greater than .05 (p=.013), while the other was greater (p=.296) which indicated that the variances were not equal. The assumption of homogeneity of variance was not met.

Mauchly's test indicated that the assumption of sphericity had been violated, x^2 (2) =28.098, p<.001. Therefore, the null hypothesis was rejected and the alternative hypothesis that the variances of the difference outcomes were not equal was accepted. When the assumption was violated, Greenhouse-Geisser correction was used, according to Pallant (2010). Results showed that there was no statistically significant interaction

effect [F (1, 21) =.168, p=.686, partial η²=.008]. The Wilks' Lambda value for time is .938. There was no statistically significant difference in math performance at the different time points [F (1, 21) =1.394, p=.251, partial η^2=.062]. The between subject effect comparing the two groups was not statistically significant [F (1, 4798.289) =.166, p=.687, partial η²=.008] (see Figure 3 and Table 10).

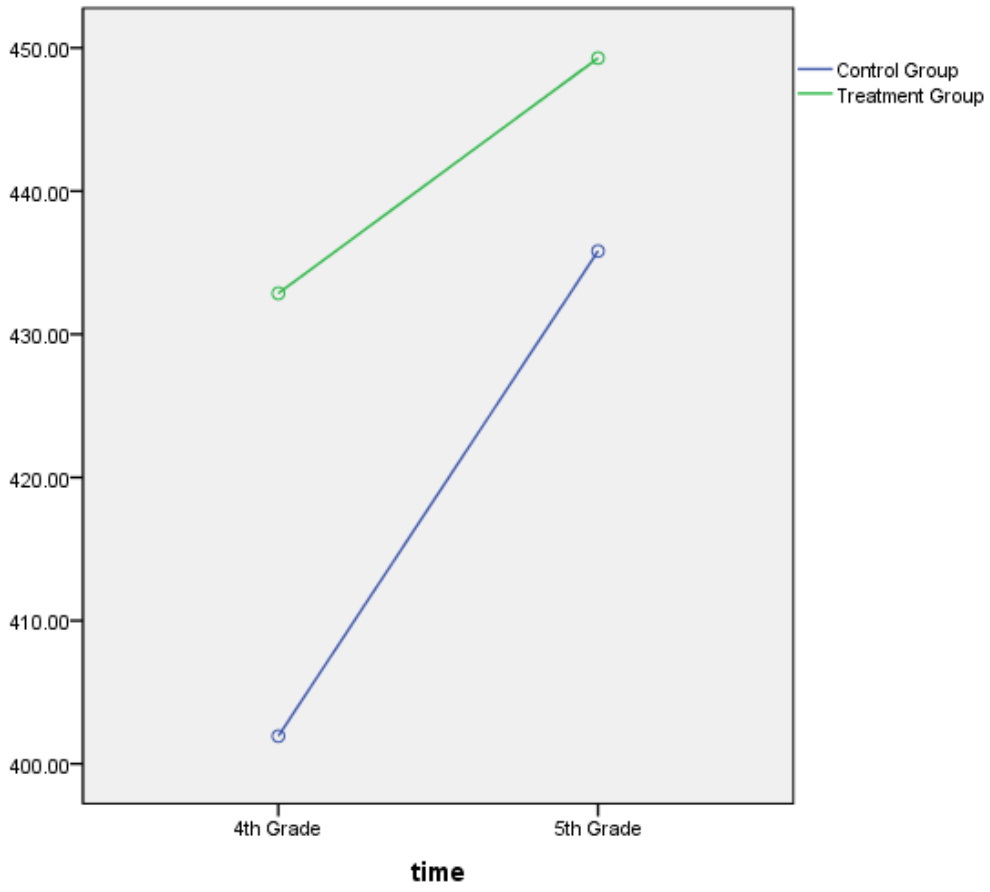

Figure 3: Comparison of Stanford Math Means (NCEs) between Treatment Group and Control Group across 4th and 5th Grades

Table 11: Descriptive Statistics of Stanford Language Means of Students in Treatment and Comparison Groups

			Mean	Std. Deviation	N
Lang NCE Grade 4	0*		350.50	132.537	16
	1		362.29	96.510	7
		Total	354.09	120.615	23
Lang NCE Grade 5	0		332.06	137.565	16
	1		371.29	131.735	7
		Total	344.00	134.076	23

*Control group coded as 0 in SPSS

As shown in Figure 3, students in the treatment group commenced with scores and continued to make progress in the fifth grade with a slightly steeper line, but students in the control group made more rapid gains than the treatment group over time.

There was homogeneity of covariance matrices as assessed by Box's test of equality of covariance matrices (p=.306) which was larger than .05. Therefore, the assumption was not violated. Levene's test of homogeneity of variance was conducted on the two language outcome variables. All the p values were greater than .05 (p=.297 and p=.647) which indicated that the variances were equal. The assumption of homogeneity of variance was met.

Mauchly's test of sphericity indicated that the assumption of sphericity had been violated, x^2 (2) =28.098, p<.001. Therefore, the null hypothesis was rejected and the alternative hypothesis that the variances of the difference outcomes were not equal was accepted. When the assumption was violated, Greenhouse-Geisser correction was used. Results showed that there was no statistically significant interaction effect [F (1, 1832.944) =.275, p=.606, partial η^2=.013]. This would be a large effect size, according to Cohen (1988, pp. 284-87). There was not a significant main effect of time [F (1,216.857) =.033, p=.859, partial η = .002], and there was not a statistically significant effect of treatment [F (1, 3167.544) =.234, p = .633, η^2 = .011].

Figure 4 provides a clear visual image of the difference between the control group and treatment group in Stanford language means. The treatment group has a steep incline in scores between fourth and fifth grades, while the control group has a steeper line indicating a higher point gain.

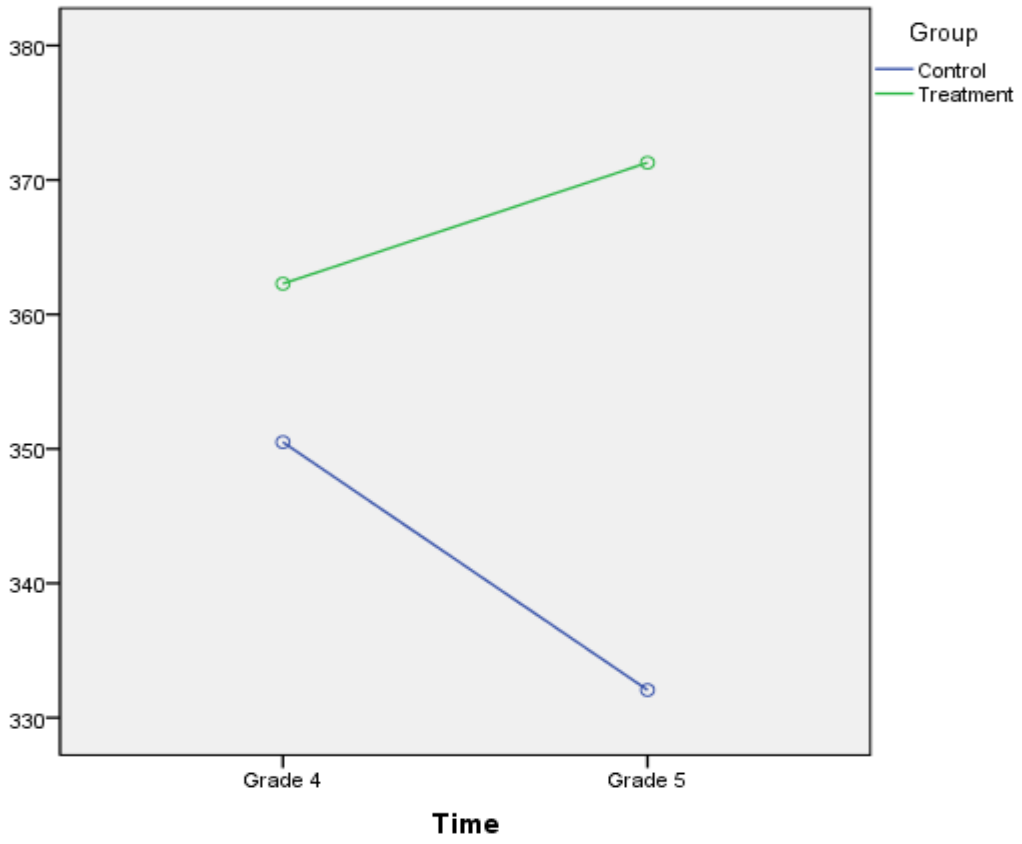

Figure 4: Comparison of Stanford Language Means (NCEs) between Treatment Group and Control Group across 4th and 5th Grade

Research Question 2: What is the impact of a 4-year whole-school reform on Hispanic ELL students' academic achievement in reading in Spanish, math in Spanish, and Spanish language arts by grade level?

To answer the second research question, a mixed between-within subjects analysis of covariance (Mixed ANOVA) was conducted to examine the impact of the

instructional intervention (Techno-learning) on students' Spanish performance in reading, math, and language across three time points. Student performance data on Aprenda were represented by the NCEs reported for all students at grade levels 1-3, as Spanish was the language of instruction following the district guidelines. A matched cohort of 225 students from both treatment and control group schools was determined as the study group for statistical analyses. Data from 2000-2001, 2001-2002, and 2002-2003 were used in the statistical analysis on SPSS 21. Table 12 provides the overall and group means, standard deviations, and sample size for each dependent variable in reading.

Table 12: Descriptive Statistics of Aprenda Reading Means of Students in Treatment and Comparison Schools

			Mean	Std. Deviation	N
Read NCE Grade 1	0*		570.30	202.507	69
	1		619.56	171.778	156
		Total	604.46	182.718	225
Read NCE Grade 2	0		513.58	213.955	69
	1		538.74	197.126	156
		Total	531.02	202.288	225
Read NCE Grade 3	0		517.80	176.002	69
	1		500.55	192.767	156
		Total	505.84	187.563	225

*Control group coded as 0 in SPSS

The three assumptions associated with the Mixed ANOVA statistical analysis were addressed. There was homogeneity of covariance matrices as assessed by Box's test of equality of covariance matrices (p=.114) which was larger than .05. Therefore, the assumption was not violated. Levene's test of homogeneity of variance was conducted on the three reading outcome variables. All the p values were not greater than .05 (p=.042, p=.601, and p=.269) which indicated that the variances were not equal. The assumption of homogeneity of variance had not been met. Reading NCE 1 scores were normally distributed for the treatment group and not the control group, as assessed by Shapiro-Wilk's test (p<.05).

Mauchly's test of sphericity indicated that the assumption of sphericity had been violated, x^2 (2) =6.888, p=.032. Therefore, the null hypothesis was rejected and the alternative hypothesis that the variances of the difference outcomes were not equal was accepted. When the assumption was violated, Greenhouse-Geisser correction was used.

Results indicate that there was a statistically significant interaction effect in the Aprenda reading performance, [F (1.941, 55891.220) =3.351, p=.037, partial η^2=.015]. There was a large effect size. The main effect of time also showed a statistically significant difference in reading performance at the different time points [(F (1.941, 406684.508) = 24.380, p<.001, partial η^2=.099]. Further examination reveals there is a significant difference between time 1 and time 2 in the within-subject contrasts [F (1, 905153.461)=28.867, p<.001, η^2=.115]. This is a rather large effect size as well. There

was no main effect of group [F (1, 17374.263) = .678, p=.411, partial ŋ =.003]. This small effect size concurs with the results. No post hoc tests were completed as there were only two groups in the investigation.

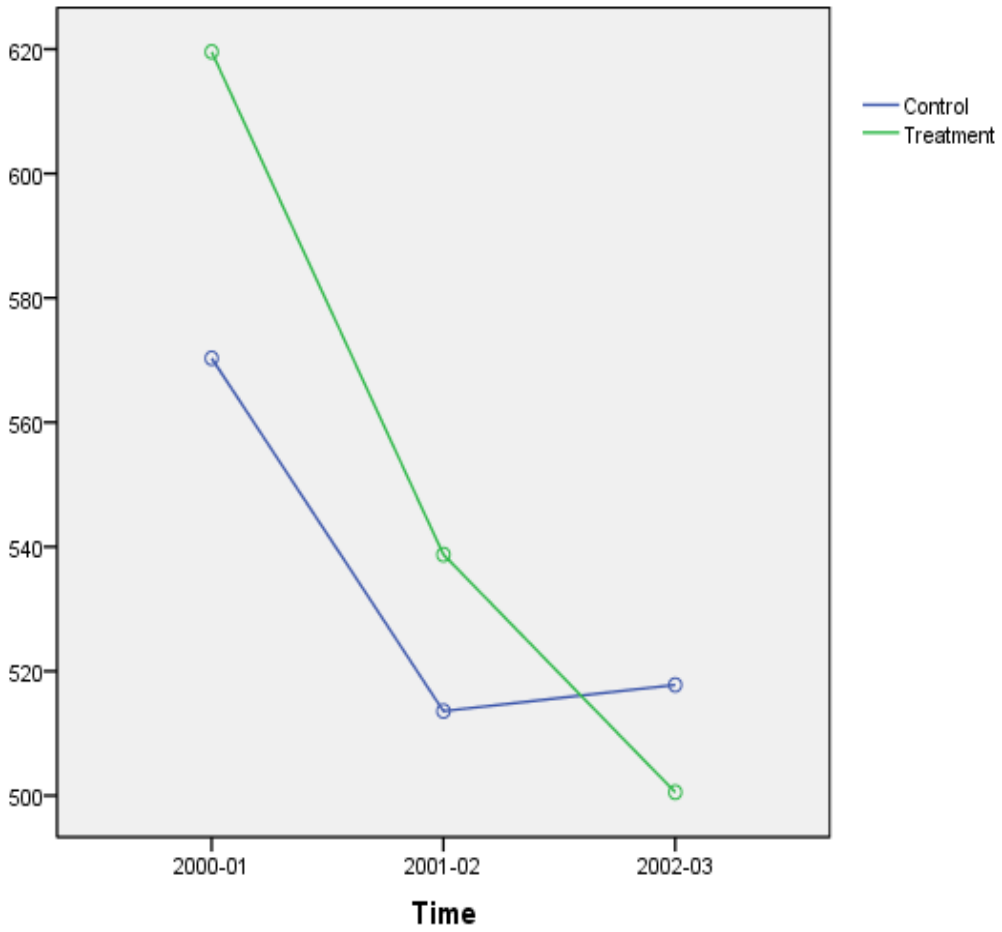

Figure 5: Comparison of Aprenda Reading Means (NCEs between Treatment Group and Control Group Across 1st, 2nd, and 3rd Grades)

The profile plots of the reading Aprenda means provided a clear visual analysis of the treatment and control group over the 3 years of data collection. The treatment

group began in year 1 (first grade) with a higher mean average. In second grade both reading scores declined in parallel, and in third grade treatment reading scores declined while control scores ascended. Figure 5 shows a comparison of Aprenda reading means.

Table 13: Descriptive Statistics of Aprenda Math Means of Students in Treatment and Comparison Schools

			Mean	Std. Deviation	N
Math NCE Grade 1	0*		520.30	176.288	69
	1		579.13	191.123	156
		Total	561.09	188.279	225
Math NCE Grade 2	0		515.35	197.181	69
	1		545.96	184.441	156
		Total	536.57	188.527	225
Math NCE Grade 3	0		471.78	154.571	69
	1		503.52	172.213	156
		Total	493.79	167.302	225

*Control group coded as 0 in SPSS

Table 13 shows data for Aprenda math means. The tests of assumptions: Box's test, Levene's test, and Mauchly's test of sphericity were addressed with math outcomes. There was homogeneity of covariance matrices as assessed by Box's test of equality of

covariance matrices (p=.311) which was larger than .05. Therefore, the assumption was not violated. Levene's test conducted on the three math outcomes were all greater than .05 (p=.902, p=.468, and p=.516) indicating that the homogeneity of variance had been met. Mauchly's test of sphericity indicated that the assumption of sphericity had been violated as the significance level was .001. The Greenhouse-Geisser was used as the correction.

There was no statistically significant interaction between the intervention and time on the Aprenda math performance [F (1.787, 13656.570) = .664, p=.499, partial η^2=.003]. The main effect of time showed a statistically significant difference in math performance at the different time points [F (1.787, 216421.482) =10.518, p<.001, partial η^2=.045]. This is a very large effect size. The main effect of group showed that there were marginally significant differences in math performance concentration between the two groups [F (1, 78049.284) =3.808, p=.052, partial η^2=.017] (see Figure 6).

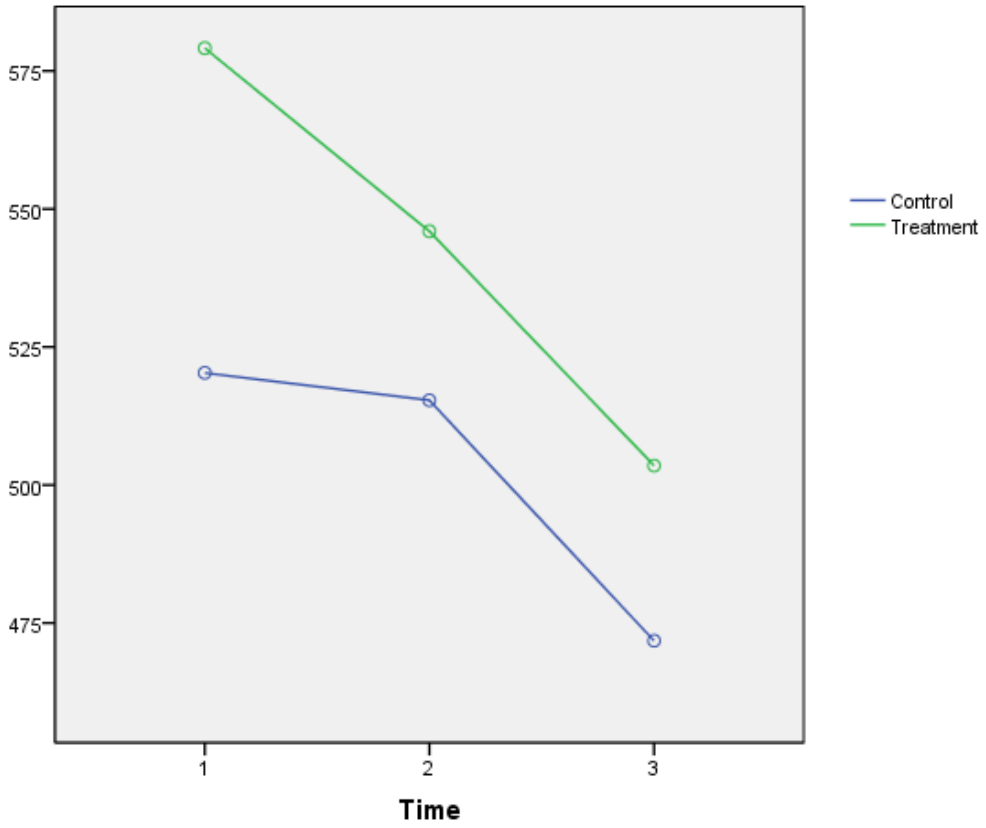

Figure 6: Comparison of Estimated Aprenda Math Means between Treatment and Control Groups

Table 14: Descriptive Statistics of Aprenda Language Means of Students in Treatment and Comparison Schools

			Mean	Std. Deviation	N
Lang NCE Grade 1	0*		522.90	159.016	69
	1		588.92	173.275	156
		Total	568.68	171.414	225
Lang NCE Grade 2	0		476.86	165.836	69
	1		512.59	165.279	156
		Total	501.63	165.904	225
Lang NCE Grade 3	0		459.74	153.388	69
	1		468.79	174.799	156
		Total	466.01	168.234	225

*Control group coded as 0 in SPSS

Table 14 shows Aprenda language means. Three tests of assumptions were addressed with the Mixed ANOVA statistical analysis. There was homogeneity of covariance matrices as assessed by Box's test of equality of covariance matrices (p=.075) which was larger than .05. Therefore, the assumption was not violated. Levene's test of homogeneity of variance was conducted on the three language outcome variables. All the p values were greater than .05 (p=.462, p=.829, and p=.065) which indicated that the variances were all equal. The assumption of homogeneity of variance was met.

Results showed that there was a marginally significant interaction between the intervention and time on the Aprenda language performance [F (2, 38876.024) =2.702, p =.068, partial ŋ²=.012]. The main effect of group was marginally significant just as the interaction term [F (1, 65267.208) =3.522, p=.062, partial ŋ²=.016]. There was a main effect of time [F (2, 416875.334) =28.972, p<.001, partial ŋ²=.115] (see Figure 7).

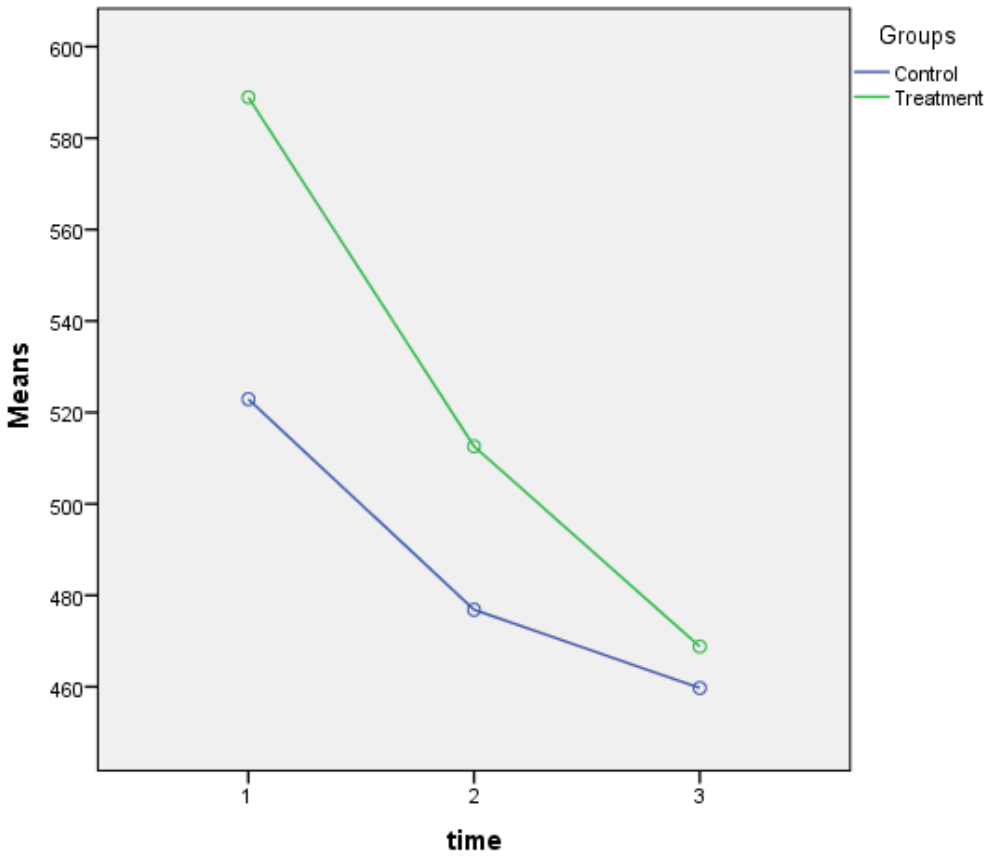

Figure 7: Aprenda Language Means across 3 Years of Intervention at 1st, 2nd, and 3rd Grades in Spanish/English Instruction Commenced the First Year with Level of Much Higher Performance in Language

Research Question 3: How did a 4-year whole-school reform impact school-level English proficiency among ELL students?

To answer question 3, data from the RPTE for treatment versus district/state comparison schools were examined employing a Mixed ANOVA statistical analysis conducted using SPSS. I focused on one data level from RPTE, Advanced/Advanced High proficiency levels by percent. The goal of the state ESL program is that students advance at least one proficiency level each year, reaching the proficiency rank of Advanced/Advanced High in a 3-year window. The percentages of student English proficiency levels on a campus were used as data points at the treatment and control campuses for a Mixed ANOVA analysis over a 4-year time period from 2000-2001, 2001-2002, 2002-2003, and 2003-2004. Students at third, fourth, and fifth grades were included in the school percentages (see Table 15). Two treatment campuses were eliminated as they fell below the required number for inclusion in the state RPTE report.

Table 15 shows data for Advanced/Advanced High levels. The three assumptions with the Mixed ANOVA statistical analysis were addressed with RPTE percentage outcomes. Box's Test was not computed as there were fewer than two nonsingular cell covariance matrices.

Table 15: Descriptive Statistics of RPTE Percentages of Advanced/Advanced High Means of Students in Treatment and Comparison Schools

			Mean	Std. Deviation	N
2000-2001	0*		66.7227	24.45297	11
	1		71.9667	20.61803	3
		Total	67.8464	23.02925	14
2001-2002	0		74.1545	24.56365	11
	1		77.8000	12.73303	3
		Total	74.9357	12.99501	14
2002-2003	0		61.7909	17.20613	11
	1		64.9000	11.10991	3
		Total	62.4571	15.76304	14
2003-2004	**0**		65.8455	9.51939	11
	1		60.3000	3.46410	3
		Total	63.8714	8.67751	14

*Control group coded as 0 in SPSS

Levene's test of homogeneity of variance was conducted on the four percentage outcome variables. All the p values were greater than .05 (p=.457, p=.858, p=.849, and p=.436) which indicated that the variances were all equal. The assumption of homogeneity of variance was met. Mauchly's test of sphericity indicated that the assumption of sphericity had been violated at the significance level of .133 which is above .05. Therefore, the null hypothesis was rejected and the alternative hypothesis that

the variances of the different outcomes were not equal was accepted. When the assumption was violated, Greenhouse-Geisser correction was used as recommended by Pallant (2010).

There was no statistically significant interaction effect [F (2.010, 67.114) =.146, p=.866, partial η^2=.012]. Further examination of the effects of time at each level time between time 2 and time 3 showed significance [F(1,12)=5.849,*p*=.032, partial η^2=.328]. There was no significant difference in NCEs between the two groups. [F (1, 8.183) =.192, p=.669, partial η^2= .016].

The profile plots of the RPTE percentages over time provide a clear visual analysis of the treatment and control groups over the four periods of data collection (see Figure 8). The treatment group begins in year 1 with higher percentages of students at the Advanced/Advanced High level. In years 1, 2, and 3 the results are parallel with the treatment group maintaining a higher percentage. The statistical analysis of contrast concurs with the profile plots as changes occur between years 2 and 3. At year 3 both groups decline in percentages. Between year 3 and year 4, treatment percentages declined while control percentages increased.

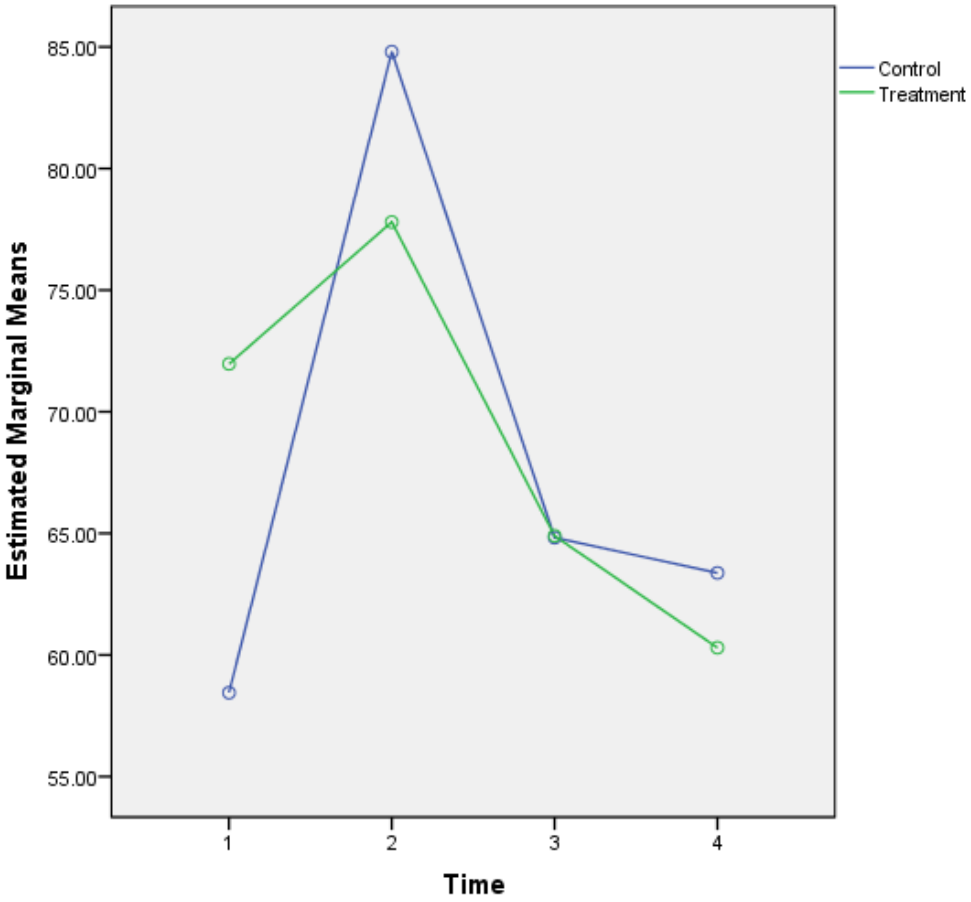

Figure 8: Percentage RPTE Scores from 2000-2001, 2001-2002, 2002-2003, and 2003-2004

Summary

A mixed between-within subjects ANOVA was conducted to investigate the extent to which the treatment (Techno-learning) affected student achievement and literacy development in Spanish and English academic performance in reading, math, and language. The mixed ANOVA can provide results as to the difference in

performance between the control group and the treatment group, and whether any effects applied equally to academic performance in the subject areas.

The findings for the English performance measures represented small increases on the profile plots, but there were no statistically significant gains. Although there were gains in math NCEs, there were no statistically significant results.

Students' academic performance in Spanish declined in reading, math, and language in both treatment and control groups. There was a main effect of time over the three time points in reading. There was marginally significant difference of .052 at the .05 alpha level between the treatment group and control group in mathematics. There was a main effect of time as well. The RPTE analysis of 4 years of data collection of percentages of students at Advanced/Advanced High also demonstrated declines in years 1-3 and a slight increase in year 4. There was not great variance in percentage changes over the 4 years of treatment group and control group.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Chapter IV reported the presentation and analysis of data. Chapter V consists of a summary of the study, discussion of the findings, implications for practice, recommendations for further research, and conclusions. The purpose of this chapter is to expand upon the concepts that were investigated to provide more understanding of ELL comprehensive school reform and how this can affect future applications.

Summary of the Study

This chapter begins with a summary of the purpose and structure of the study and is followed by discussion of major findings related to the implementation of the Techno-learning comprehensive school reform. Conclusions from findings of the study are discussed in relation to the variables which may have been significant factors in the results of student achievement and language development. Finally, implications for practice and recommendations for further research are presented and discussed.

In 1991, when NAS launched its efforts on behalf of whole-school reform, the motivation was at least in part due to the poor national testing results of former piecemeal approaches (Berends, Bodilly, & Kirby, 2002). Many different models of whole-school reform were designed and offered to schools. Yet there was no research-based school reform focused on English language learners. The Comprehensive School Reform database contained numerous examples of successful implementations, but none

included a reform with dual-language student populations showing research-based results.

The purpose of this study was to investigate the possible relationship between whole-school reform in five bilingual/dual-language urban campuses, student achievement, and language proficiency using quantitative research. The sample included identified Hispanic bilingual students in Grades 1-5 on the participating campuses. The non-treatment schools were selected from the same district for demographic similarity. Archival data consisting of normal curve equivalent scores in reading, math, and language (Aprenda and Stanford) were compiled for both groups from 2001-2005, which were the treatment years. To examine language development, data from the RPTE were compiled from the treatment schools and the comparison schools. Comparison schools were selected for demographic similarity from campuses across Texas as well as non-treatment schools in the district.

Discussion of the Findings

Research Question 1: What is the impact of a 4-year whole-school reform on Hispanic ELL students' achievement in reading, math, and language in English by grade level?

Stanford results were collected from a 23-student cohort of fourth and fifth grade students in the treatment and control schools in the district. This small cohort of 23 students may reflect the exit of many students from the program after Grades 1, 2, or 3. Campus Language Proficiency Assessment Committees make exit decisions. According

to program guidelines in the study district, students receive 80-90% instruction in English at fourth and fifth grade levels.

Students in the treatment group had higher scores in reading, math, and language in fourth grade than did students in the control group schools. There might have been positive effects from the treatment for students who had entered the intervention from the onset in 2000-2001. Additionally, the study district has a relatively high average mobility rate of 16.6% for the treatment group and 18.9% for the district comparison schools. There were small performance gains, but they were not statistically significant. Students who are transitioning into English would be tested with the Stanford assessment. This may indicate that many students were transitioning into English or exiting the bilingual program; thus creating a lower number of student results in English. In addition, state guidelines for immigrant students would have allowed them to exempt testing in their first year of residency.

Research Question 2: What is the impact of a 4-year whole-school reform on Hispanic ELL students' academic achievement in reading in Spanish, math in Spanish, and Spanish language arts by grade level?

The Spanish cohort was larger than the English cohort. This may be due to three issues: 1) at the time of the study, students entering a bilingual/ESL state instructional program were not allowed to exit until the end of first grade; 2) program guidelines regarding transition into English required a certain score on Spanish literacy; and 3) students receiving reading instruction in Spanish were transitioned into English after

third grade instruction. Students began in their native language and proceeded to English at fourth and fifth grades.

Results from the Aprenda reading, math, and language performance assessments in a 3-year window show declines in both the treatment and control groups. These results may suggest a mitigating factor which is not included in AEIS, Techno-learning comprehensive reform, or district program guidance. The findings from Research Question 2 indicated that there was a performance dip in both the comparison and treatment schools. It was more pronounced in comparison schools. One of the consistent findings about the change process in education is that successful schools may experience an "implementation dip" (Fullan, 2001). This implementation dip is not simply a dip in performance but also in confidence as many innovations require new skills and new understandings.

With the advent of whole-school reform, the school context has changed considerably. In these circumstances, leadership requires a balance between support and pressure; but mostly, a leader who pays attention to people, focuses on building emotional bonds, builds relationships, and heals rifts. Effective leaders have the right kinds of sensitivity to implementation efforts (Fullan, 2007). Yet in this era of accountability, it still remains that the principal is ultimately responsible for the school's success.

Administration and staff may feel challenged by the aspects of change in the project; in particular, the use of technology and new curricular innovations such as project-based learning. Leaders who comprehend the implementation dip know that

people experience two types of issues when they are in the dip—the socio-psychological fear of change and the lack of technical knowledge needed to make the change work.

Leadership in a reform context requires a transformation of the culture—changing how things are done. Leaders need to be aware of respective styles, and be able to choose the most effective one when necessary:

> Leading in a culture of change means creating a *culture*, not just a *structure***,** of *change*. It does not mean adopting innovations, one after another; it does mean producing the capacity to seek, critically assess, and selectively incorporate new ideas and practices—all the time, inside the organization as well as outside it. (Fullan, 2007, p. 177)

In this scenario, the campuses were not only experiencing a curriculum innovation; but also a change in administrative leadership which further complicated this process. This can be evidenced by data shown in Table 16. Béteille and colleagues (2012) and Miller (2013) assert that principal changes, especially in low socio-economic populations, have an effect on student achievement.

Principals accepting new leadership in project schools would not have attended the earlier staff development days in which principals received intensive training during development of the project, including cross-country visitations to other successful projects. Neither were they present when the whole school voted to embrace the 5-year intervention. Finally, they may not have interest in the innovation's success.

Table 16: Changes in Administration, DC1 District Comparison TG1* Treatment Group**

School	No. of Changes	ALSI✷
DC1**	1	.857
DC2	1	1.000
DC3	2	.714
DC4	3	.571
TG1*	1	.857
TG2	0	1.000
TG3	1	.857
TG4	2	.714
TG5	1	.857

*

**

ALSI - Administrative Leadership Stability Index ✷ (x-n) Where "x" is the number of years being considered and "n" is the number of leadership x changes taking place during the considered years

Changes in Administration from 2000-2006

In the past, scholars studying "effective schools" concluded that the principal is key in determining effectiveness of a school (Edmunds, 1979; Horng & Loeb, 2010). When principal effectiveness was investigated, they noted that principals who are good leaders are highly goal oriented, hold a vision for the campus, have a clear sense of their role, and are alert to opportunities to influence what is occurring in the school as well as clear communication with all constituencies in the school community.

The Leadership Development Team, comprised of principals, half-time site facilitators, and the project director, met on a consistent basis to support sustainability of the project schools, but it is difficult for a campus leader to work with mid-stream innovations. In fact, administrative change coupled with the implementation dip may have resulted in significant challenges for this reform project. It is clear that faculty, staff, and the community as a whole collaborating may create lasting changes in student achievement only if student success is the central focus of all initiatives. It is the principal who will provide oversight of this process. Without stability of leadership, this may have an effect on student achievement.

Research Question 3: How did a 4-year whole-school reform impact school-level English proficiency among ELL students?

RPTE testing was conducted once each year on any student who was identified as LEP in the school district until students met the exit criteria. As discussed earlier, the very nature of the data collection of the RPTE affected the analysis. The percentage of students in the Beginner category, for instance, at the beginning of the year is compared to the percentage of students at that level at the end of the year. Discrepancies arise when students are identified at any point before the end of year testing. It cannot be stated that they have had an opportunity for a full year's growth.

Using mixed ANOVA analysis, there was no statistically significant difference in RPTE percentages between the treatment and control groups over time. Without scale scores which provide more specific information of individual students, it was difficult to

determine the changes. It is clear, though, to see the visual evidence of parallel plot lines as in Figure 8.

In addition to proficiency scores, there were other mitigating factors that may have affected the results of this study. These factors include student-teacher ratios, as discussed below.

Student-Teacher Ratios

There has been great diversity in the research of class-size reduction initiatives. Investigators of the California Class-Size reduction initiative (Ogawa, Stine, & Huston, 1998) expressed concern that smaller class size, especially with high percentages of Latino students, resulted in placing teachers with less overall teaching experience. Krieger's Louisiana study suggested that smaller classes led to more interaction and thus higher academic achievement (2003). The STAR study in Tennessee (Folger & Breda, 1989) found that there were cumulative effects and gains over a 4-year period for students in Grades K-3 with small classes. Figure 9 presents student-to-teacher ratios in the treatment and control group schools.

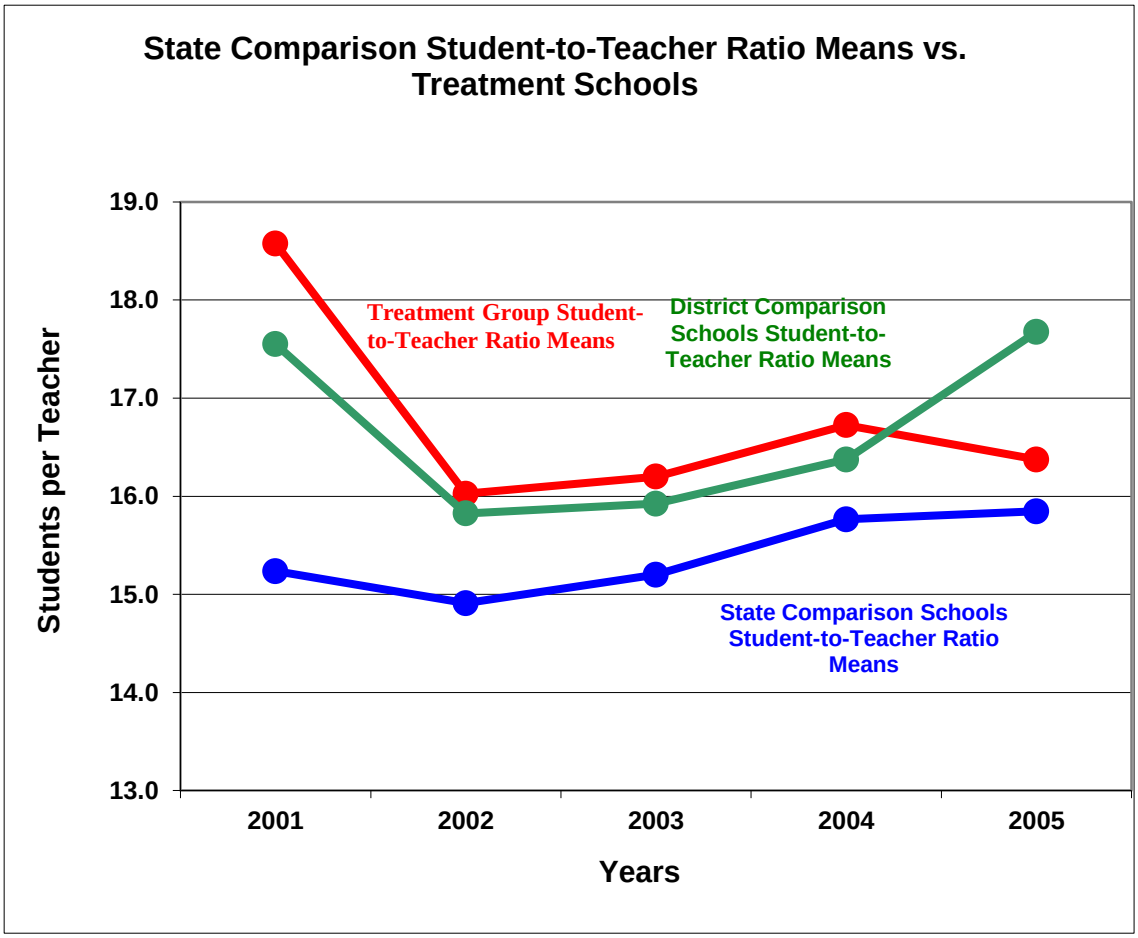

Figure 9: State Comparison Student-to-Teacher Ratios

The treatment schools have slightly higher student-to-teacher ratio means for the study years than the district comparison schools. Both district and treatment groups have higher student-to-teacher ratio means that the state comparison schools. The ratio of students to teachers was higher in the treatment schools, as there was no additional funding for more teachers to create smaller class sizes through the grant. The grant did provide supplemental funding for one half-time facilitator on each participating campus. The project did not require smaller class sizes, but the actual size of many physical

classrooms built in 1945-1960 in the district could not accommodate the statewide elementary class load allowance of 22 to 1.

Student-to-teacher ratios (S/T) relate to school efficiency, with teacher salaries as a function of spending efficiency and production efficiency. Alspaugh (1994) shared an example that if half of the school budget is spent on teachers' professional development to improve efficiency, schools with higher S/T ratios will have more money for instructional materials, supplies, and other support items for teachers. The conclusion here is that teachers will gain skills in handling larger classrooms and become more effective, more productive, with time to teach a larger group of students. On the other hand, there are teachers who simply agree to higher student/teacher ratios to have higher salaries. Figure 10 provides visual representation of the student-to-teacher ratios for the target population in the study.

The treatment schools have slightly higher means of the LEP student-to-teacher ratios than the state comparison schools without the Houston comparison schools except for 2005. The district comparison schools have slightly higher means of LEP student-to-teacher ratios than treatment schools. The district comparison schools also have slightly higher means of LEP student-to-teacher ratios than state comparison schools.

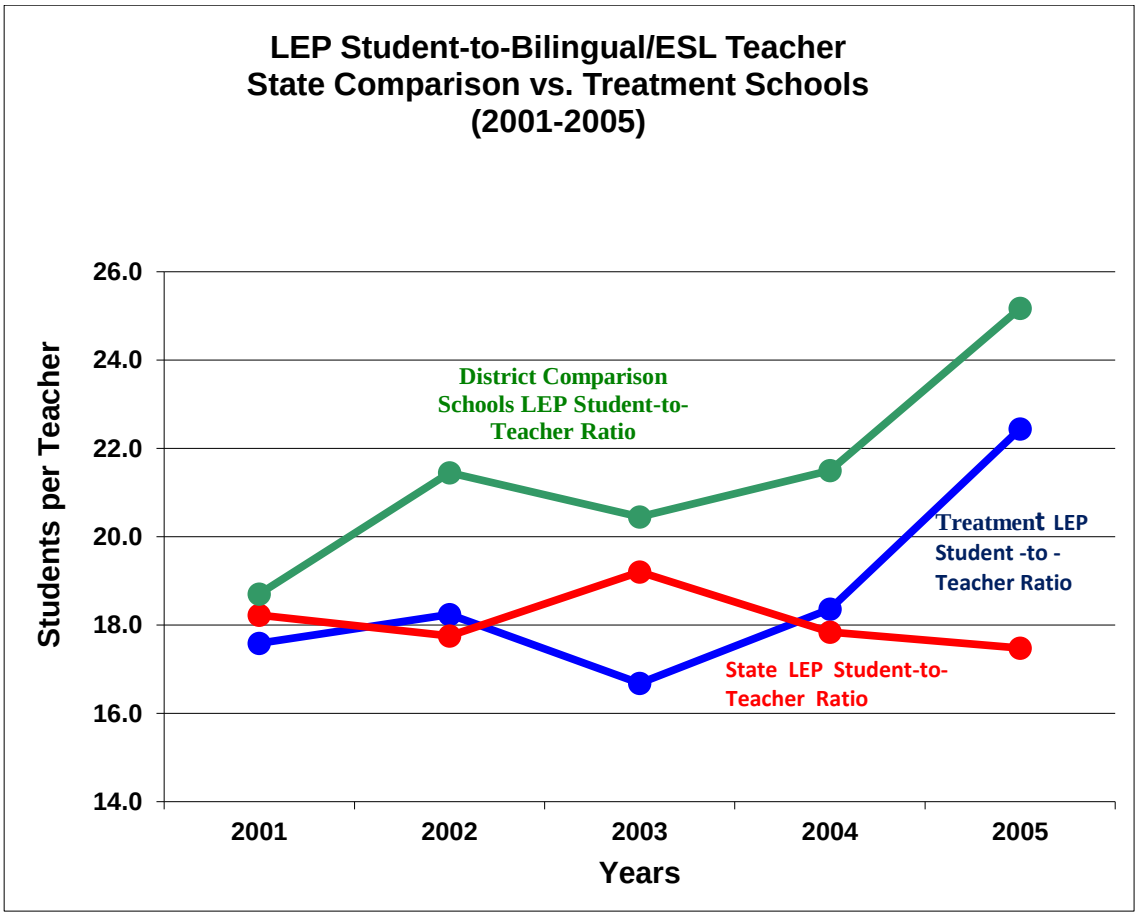

Figure 10: LEP Student-to-Teacher Ratios

The effect of school size on achievement may differ for variations in size of small schools as compared to variations in size of relatively large campuses. In his research, Alspaugh (1994) found that there were contextual variables that can explain the varied results of student/teacher ratios. When classes are small, the relaxed atmosphere with increased opportunities for social interaction may increase student achievement. On the other hand, teachers in larger classes create a very orderly environment. There is more time on the learning task and higher achievement test scores prevail. A large

portion of school-to-school variance in student achievement is not part of school control because of schools complexity, and many of the services provided by schools cannot be quantified adequately by student achievement tests. In addition, the guidelines for bilingual/ESL students provide that 10% of the Bilingual/ESL allotment must provide staff development if the campus does not have all certified Bilingual/ESL teachers. Many campuses are required by law to provide ESL professional development. Another factor which may affect student/teacher ratio is the fact that classes for certified teachers may become larger, because there are not enough certified Bilingual/ESL teachers in the school.

Implications for Practice

The findings of this study have implications for educators interested in comprehensive school reform and, in particular, in related student achievement. This study identified links between educational administrators, teacher experience, student mobility, student-to-teacher ratios, and other variables which constitute a very complicated context. In responding to Research Questions 1 and 2, these are factors which may affect the ability to improve student achievement.

This study may be useful to leaders contemplating school reform. Recently, the What Works Clearinghouse, a part of the Institute of Education Sciences (IES), has established criteria which educators/researchers will be subject to if they wish their research studies to be considered robust. School districts can employ this review to investigate school reform models and their effectiveness. Many studies quantify the success of comprehensive school reform and student achievement from the norm-

referenced testing or statewide criterion-referenced assessments using pre- and post-data, without investigating the variables that actually play a significant role in the process. The context of the district and the schools may be the determining factor in a decision to embark on an innovation.

This study's findings may be useful to educators seeking information about the impact of school reform with a more robust, comprehensive analysis. There is still a gap in the literature regarding comprehensive school reforms or innovations which impact student achievement. In the literature review, there were few investigations (Cheung & Slavin, 2012; Calderon, 1998; Holm, 2011; Tong, Lara-Alecio, Irby, & Mathes, 2011) which actually employed widely accepted academic statistical analysis. When districts are considering an innovation, a pilot program is an option. Borman (2005) emphasizes the need to carefully scrutinize a reform model before implementing it. As this study suggests, many of the reform model results are posted by in-house evaluators and boast numerous results with effect sizes.

Another concern for practitioners is the issue of sustainability. Many reforms such as this study treatment were the result of limited funding with matching funding required to obtain the initial 5-year grant. Reaching institutionalization is a continuous process which includes all levels of teacher, administrator, community, and staff to embed an innovation into the organizational structure. District-level support for innovations is essential to the financial support and professional development which campuses require to sustain the project.

Recommendations for Further Research

Effective-schools research as it was conducted 25-30 years ago would be difficult to replicate at this time. There are not many schools that have not had an external reform or systemic change. The goal of this study was to investigate the effect that the comprehensive school reform Techno-learning had on student achievement and literacy development. Data were collected to test three research questions relating to this. The information was studied and findings resulted from examination of the data. Archival data were collected and analyzed from AEIS, district, and state resources.

Another avenue of recommended further research might be actual interviews with administrators, teachers, and students. These interviews could address teacher and administrator perceptions as well as issues in fidelity of implementation. A mixed-method study which included administrator and teacher interviews or surveys would be helpful to respond to some of the current issues. The context of the treatment is just as critical as the outcomes.

Longitudinal data collection of LEP students after they exit the programs (Thomas & Collier, 2002) is another area for further research if students have demonstrated academic success. In light of research in language acquisition (Collier, 1987; Cummins, 1980; Hakuta, Butler, & Witt, 2000), it is difficult to expect academic progress from students who have not had the research-based time sufficient to establish academic proficiency.

Limitations

Student mobility rates at the campuses were relatively high, 16.6% average in the treatment schools and 18.9% average in the district comparison schools (Kerbow, 1996; Engec, 2006). These mobility rates may have affected the collection of data. Use of RPTE as a scale score might have provided a more detailed report of performance rather than percentages of those who changed their scores from one level to the next. Unfortunately, these scores were not available at the district level or state level to provide any comparison.

Conclusions

Even with all the reform support recommended through the intervention (LDT, site facilitators, self-assessment) the results of this intervention may have been affected by changes in administration. I researched the possible factors that might influence such a decline and hypothesized that performance scores could have been impacted when a school has a change in administrative leadership (Fullan, 2007). Thus, administrative leadership (principal) changes were identified for each of the comparison and treatment schools. A change in administrative leadership has shown to generally have a negative impact on student performance (Béteille et al., 2012; Fullan, 1993; Gates et al., 2004; Miller, 2013). Invariably, commitments to past programs are changed, perhaps priorities for them shuffled.

The implementation dip and the changes in administration could have an effect on the success of this comprehensive school reform. The other uncontrollable variables such as student-to-teacher ratio, mobility rates, statewide and district-wide testing, and

accountability all presented challenges to the success of a PBL innovation called Techno-learning.

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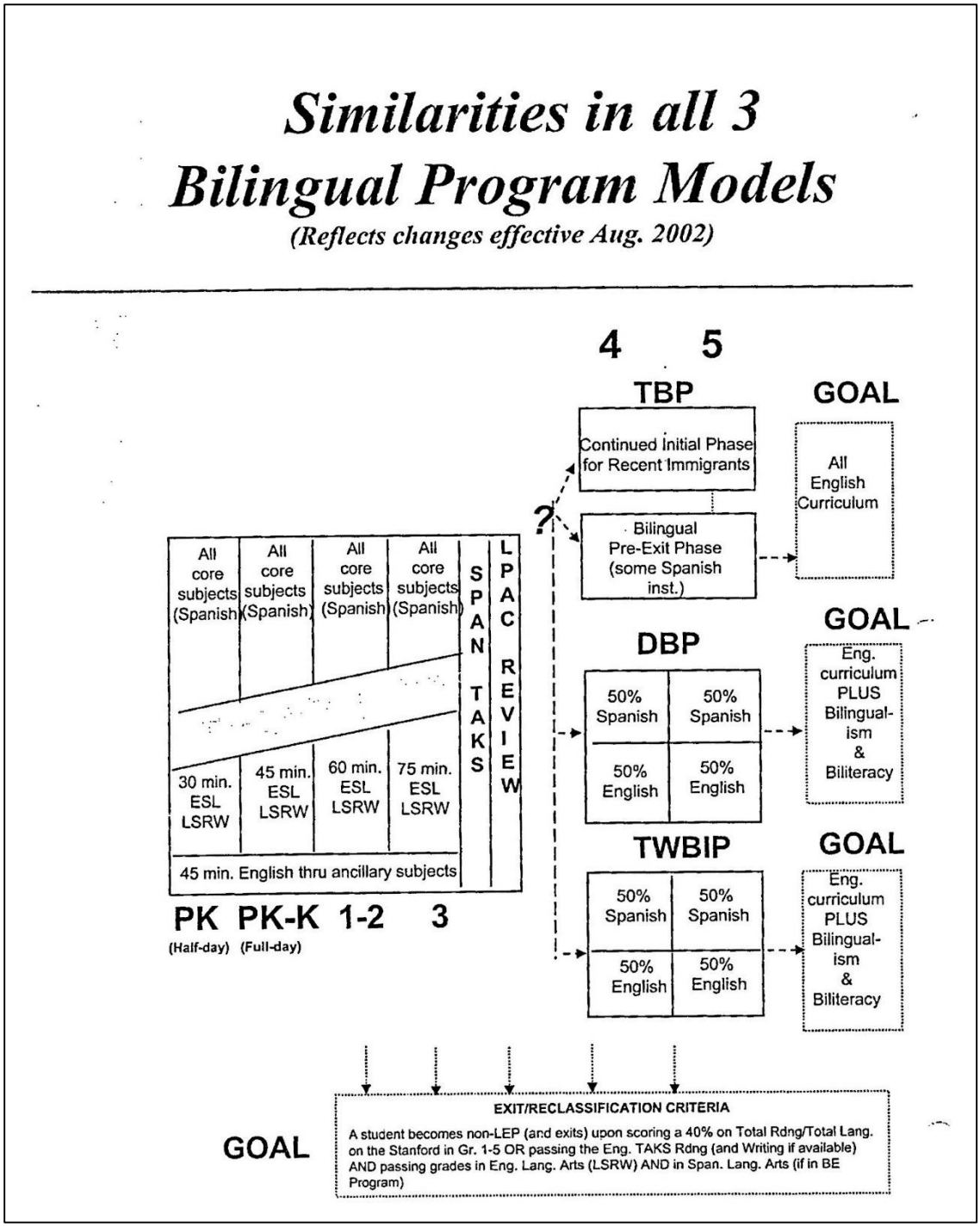
APPENDIX A

SIMILARITIES IN BILINGUAL PROGRAM MODELS



APPENDIX B

SAMPLE ANNUAL PERFORMANCE REPORT

; Elementary School's action plan, academic year 2002 – 2003

Benchmarks	Status
Benchmark 1: SHARED ACCOUNTABILITY FOR RESULTS Faculty will create a School Action Plan by August 2002. This plan will be shared with the entire faculty (August 2002) and school community (September 2002) and will outline SMART school goals, which are based on a careful analysis of needs. All teachers will complete a minimum of one project by May 2003 that involves outside community experts and is focused on a school or community issue that may result in a product that is meaningful to the school or community. Schoolwide theme for the 2002-2003 school year is "Making a Better World".	Ø
Benchmark 2: PROJECT-BASED LEARNING—TEACHING FOR UNDERSTANDING AND ACCOMPLISHMENT During the 2002-2003 school year, all teachers will complete a minimum of one project based on Project Clear standards and containing the following elements: • Student work samples and related rubrics • Self and peer assessment (student use of rubrics and self-reflections regarding learning) • Multiple opportunities for student presentations to develop oral language proficiency • Open-ended driving issue, problem, or question that inspires higher-level thinking • Final products and performances that show evidence of higher-level thinking • Lesson plans incorporating a variety of instructional formats with an emphasis on increasing critical thinking such as debates, problem-solving role-play, teacher and student led inquiry, reflecting and evaluating the learning experience • Quantitative/Mathematical Thinking This project can be selected from the projects database and adapted, completed as a team or individual, or focused on an individual discipline or be interdisciplinary.	Ø
Benchmark 3: COMPREHENSIVE ASSESSMENT FOR CONTINUOUS IMPROVEMENT By October 2002, all teachers will use a performance task and its associated rubric that assesses student progress toward identified standards. By November 2002, each grade-level team of teachers will assess a minimum of one common product from a performance task using a rubric that was given to the students prior to the project or activity in order to determine consistency of expectations. By December 2002, teams of teachers will assess one best and average work sample from each grade using a rubric that was given to the students prior to the assignment in order to determine consistency and progression of expectations across grades. By February 2003, all teachers will create or modify a rubric with their students and have students use it to assess and revise their own work. By April 2003, all teachers will share with their team at least one student rough draft and final draft of a performance task to reflect on the strengths and challenges of the performance task, rubric, and feedback given to the student as means for helping the	Ø

student improve his/her work. Throughout the 2002-2003 school year, rubrics will be posted in the classrooms for student and teacher use. Throughout the 2002-2003 school year, student-led conferences will be piloted in the 5th grade classes.	
Benchmark 4: TEAM-BASED SCHOOL ORGANIZATION By November 2002, teachers will make a peer observation that encourages reflective practice and helps improve instructional strategies within the school. During the 2002-2003 school year, all 2nd year teachers and above will be involved in at least one campus committee.	Ø
Benchmark 5: SENSIBLE USE OF TECHNOLOGY By November 2002, the school will have a technology plan, which outlines long- and short-term goals in the areas of technology integration, participation in teleprojects, training, the formation of a student technology team (5th graders), and hardware and software purchasing. By September 2002, a technology action team will have identified the technology training needed for the faculty based on a survey of teacher technology needs. By October 2002, the team will have planned professional development trainings focused on these needs. By October 2002, the school (including new faculty members) will continue to use e-mail as a primary mode of communication to improve timely effective communication between all faculty members and open communication with other professionals across the country. During October and November 2002, the school will participate in the Kids Who Read teleproject. During the 2002-2003 school year, teachers will utilize the computer lab and library. During the 2002-2003 school year, teachers will develop a checklist or rubric which outlines the technology TEKS for each grade level. By January 2003, all teachers will incorporate technology into at least two student lessons.	√

√. Achieved Ø. In progress

Scheduled Dates:

Dates	Topic
10/16/02	Grade level planning
10/23/02	Technology Planning for Prof Dev
11/07/02	To be determined by grade level plans
11/14/02	To be determined by grade level plans
01/08/03	Prepare for Critical Friends
01/22/03	Critical Friends Project Fair
01/23/03	Critical Friends School Visit
01/24/03	Critical Friends Report to Faculty
01/25/03	Houston PBL Conference
03/13/03	To be determined by grade level plans
03/25/02	To be determined by grade level plans

APPENDIX C

PERMISSIONS

HOUSTON INDEPENDENT SCHOOL DISTRICT
HATTIE MAE WHITE EDUCATIONAL SUPPORT CENTER
4400 WEST 18th STREET • HOUSTON, TEXAS 77092-8501

ABELARDO SAAVEDRA, Ph.D.
Superintendent of Schools

Carla J. Stevens
Assistant Superintendent
Research and Accountability Department
Tel: 713-556-6700 • Fax: 713-556-6730

February 25, 2008

Trudy Freer-Alvarez
Houston ISD
4400 W. 18th Street
Houston, TX 77092

Dear Ms. Freer-Alvarez:

The Houston Independent School District (HISD) is pleased to approve the research project titled "The Impact of a Comprehensive School Reform Model on Student Achievement on a Group of Urban Bilingual Campuses." The purpose of this research is to document and compare student achievement and reading proficiency data at five campuses following comprehensive reform funded by a five-year Title VII grant. The projected date of completion is May of 2008.

Approval to conduct the study in HISD is contingent on meeting the following conditions:

- The target population is (a) bilingual students enrolled at the following campuses: Browning, Crockett, Love, Helms, and Stevenson elementary schools, as well as (b) matched comparison campuses: Benbrook, Field, Looscan, and Ryan elementary schools.
- Data will consist of Stanford, Aprenda, and TELPAS/RPTE results for those campuses for the period 1998 to 2007.
- The principals from each participating school will receive a copy of the proposal.
- The research project will not require the use of any school premises, nor the collection of data from any individual student or staff member involved with the two-way program.
- The principal investigator will be responsible for data collection in this study and all costs associated with obtaining data. This may require the filing of a separate data request with the district at the time that data is needed.
- The investigator will follow HISD and University of Houston guidelines for human subjects protection and confidentiality.
- The study will not interfere with the districtwide instructional/testing program.
- School personnel and students will not be identified in the research process or final reports.
- The study involves no expense to the district.
- The district will receive copies of the completed final report within 30 days of its completion.

Any changes or modifications to the current proposal must be submitted to the Department of Research and Accountability for approval. Should you need additional information or have any questions concerning the process, please call (713) 556-6700.

Sincerely,

Carla Stevens
Assistant Superintendent
Research and Accountability

CS: kab
cc: Karen K. Soehnge
Michele Pola
Noelia Garza
Irma Rohatgi
Regional Superintendents
Executive Principals

DIVISION OF RESEARCH

TEXAS A&M UNIVERSITY

DATE: September 25, 2015

MEMORANDUM

TO: Rafael Lara-Alecio
TAMU - College Of Education & Human Dev - Educational Psychology

FROM: Dr. James Fluckey
Chair, TAMU IRB

SUBJECT: Exempt Approval—Continuing Review

Study Number:	IRB2007-0558M
Title:	The Impact of a Project-Based Learning Comprehensive School Reform Model on Student Achievement on a Group of High Population Bilingual Campuses in an Urban Setting
Date of Determination:	
Approval Date:	10/05/2007
Continuing Review Due:	08/15/2020
Expiration Date:	09/15/2020

Comments: The continuing review for this study has been approved.

Investigators assume the following responsibilities:

1. **Continuing Review:** The study must be renewed by the expiration date in order to continue with the research. A Continuing Review application along with required documents must be submitted by the continuing review deadline. Failure to do so may result in processing delays, study expiration, and/or loss of funding.
2. **Completion Report:** Upon completion of the research study (including data collection and analysis), a Completion Report must be submitted to the IRB.
3. **Unanticipated Problems and Adverse Events:** Unanticipated problems and adverse events must be reported to the IRB immediately.
4. **Reports of Potential Non-compliance:** Potential non-compliance, including deviations from protocol and violations, must be reported to the IRB office immediately.
5. **Amendments:** Changes to the protocol and/or study documents must be requested by submitting an Amendment to the IRB for review. The Amendment must be approved by the IRB before being implemented.
6. **Consent Forms:** When using a consent form or information sheet, the IRB stamped approved version must be used. Please log into iRIS to download the stamped approved version of the consenting instruments. If you are unable to locate the stamped version in iRIS, please contact the iRIS Support

750 Agronomy Road, Suite 2701
1186 TAMU
College Station, TX 77843-1186
Tel. 979.458.1467 Fax. 979.862.3176
http://rcb.tamu.edu

Team at 979.845.4969 or the IRB liaison assigned to your area. Human participants are to receive a copy of the consent document, if appropriate.

7. **Post Approval Monitoring:** Expedited and full board studies may be subject to post approval monitoring. During the life of the study, please review and document study progress using the PI self-assessment found on the RCB website as a method of preparation for the potential review. Investigators are responsible for maintaining complete and accurate study records and making them available for post approval monitoring. Investigators are encouraged to request a pre-initiation site visit with the Post Approval Monitor. These visits are designed to help ensure that all necessary documents are approved and in order prior to initiating the study and to help investigators maintain compliance.
8. **Recruitment**: All approved recruitment materials will be stamped electronically by the HRPP staff and available for download from iRIS. These IRB-stamped approved documents from iRIS must be used for recruitment. For materials that are distributed to potential participants electronically and for which you can only feasibly use the approved text rather than the stamped document, the study's IRB Study Number, approval date, and expiration dates must be included in the following format: TAMU IRB#20XX-XXXX Approved: XX/XX/XXXX Expiration Date: XX/XX/XXXX.
9. **FERPA and PPRA:** Investigators conducting research with students must have appropriate approvals from the FERPA administrator at the institution where the research will be conducted in accordance with the Family Education Rights and Privacy Act (FERPA). The Protection of Pupil Rights Amendment (PPRA) protects the rights of parents in students ensuring that written parental consent is required for participation in surveys, analysis, or evaluation that ask questions falling into categories of protected information.
10. **Food:** Any use of food in the conduct of human research must follow Texas A&M University Standard Administrative Procedure 24.01.01.M4.02.
11. **Payments:** Any use of payments to human research participants must follow Texas A&M University Standard Administrative Procedure 21.01.99.M0.03.
12. **Records Retention**: Federal Regulations require records be retained for at least 3 years. Records of a study that collects protected health information are required to be retained for at least 6 years. Some sponsors require extended records retention. Texas A&M University rule 15.99.03.M1.03 Responsible Stewardship of Research Data requires that research records be retained on Texas A&M property.

This electronic document provides notification of the review results by the Institutional Review Board.