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TIER I RTI FOR ENGLISH LANGUAGE LEARNERS WITH LANGUAGE DEFICITS

by

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ABSTRACT

Educators are attempting to eliminate the disproportionate representation of culturally and linguistically diverse students in special education through initiatives such as Response to Intervention (RtI). Prior to the implementation of such initiatives, existing research relevant to this population must be critically reviewed and expanded. A synthesis of the available literature can provide significant insight into the type of data necessary to make informed decisions involving English language learners (ELL) at Tier I of an RtI model. In forming the theoretical foundation for this research, cognitive deficits associated with language-based disabilities and principles of cognitive load theory were examined. The study is an investigation of the following research question: Is the effectiveness of the bilingual English as a Second Language (ESL) model significantly altered under certain conditions?   The research question was addressed through testing moderator effects using hierarchical linear regression. Initial English proficiency and initial Spanish proficiency were examined as moderating variables of the relationship between ESL model type and Kindergarten academic achievement. Academic achievement was defined as student learning growth on the Florida Assessment for Reading Instruction (FAIR) and student outcome scores on the Comprehensive English Language Learning Assessment (CELLA) Listening/Speaking and Reading constructs.

Results supported: a) the relationship between initial English proficiency and FAIR growth, CELLA Listening/Speaking, and CELLA Reading, b) the relationship between initial Spanish proficiency and FAIR growth and CELLA Listening/Speaking, c) the relationship between type of ESL model and FAIR growth, CELLA Listening/Speaking, and CELLA

Reading, d) the additional effect of the interaction of initial Spanish language proficiency with ESL model type to alter FAIR learning growth over time, and e) the additional effect of the interaction of initial English language proficiency with ESL model type to alter CELLA Listening/Speaking scores. Overall, this research supports the hypothesis that initial language proficiency can significantly alter the effectiveness of a bilingual ESL model. Recommendations for future research in this area include longitudinal studies using a similar hierarchical regression design with moderators in order to contextualize positive student outcomes.

ACKNOWLEDGMENTS

Finally, to my beloved **husband** and **son**, I deeply appreciate the many sacrifices you have made for me to reach the end of this path. I love you more than words could express and this road was paved for you.

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LIST OF NOMENCLATURE

ELL	English Language Learner
ESL	English as a Second Language
TESOL	Teaching English to Speakers of Other Languages
RtI	Response to Intervention
CLT	Cognitive Load Theory
NCLB	No Child Left Behind
preLAS-2	Pre- Language Assessment Scale 2
CELLA	Comprehensive English Language Learning Assessment
FAIR	Florida Assessment for Instruction in Reading
FAIR1	Beginning-of-year FAIR
FAIR2	Middle-of-year FAIR
FAIR3	End-of-year FAIR
F/RLunch	Free/Reduced-Cost Lunch Status
InitialENG	Initial English Proficiency
InitialSPA	Initial Spanish Proficiency
ESLEINT	ESL Model x Initial English Proficiency
ESLSINT	ESL Model x Initial Spanish Proficiency
FAIRGrowth	FAIR3- FAIR1
CELLAListSpk	CELLA Listening/Speaking
CELLAReading	CELLA Reading
SPSS	Statistical Package of Social Science

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CHAPTER 1: INTRODUCTION

Introduction

An expansion of the knowledge base relative to the current population of English language learners (ELL) is important in order for schools to be able to make informed educational decisions and implement valid research-based interventions and instruction with this population. Specifically, research which investigates interventions that improve student academic achievement and positively impact learning is needed (Paradis, Crago, Genesee & Rice, 2003). The current researcher seeks to synthesize research from four specific academic disciplines: 1) Education, 2) Educational Psychology, 3) Teaching English to Speakers of Other Languages (TESOL), and 4) Communication Disorders. This conceptual framework serves as the rationale for the current study investigating the conditions which alter the effectiveness of the bilingual English as a Second Language (ESL) instructional model.

Statement of the Problem

Over the past twenty years, the United States has experienced a significant shift in demographics (Shin & Bruno, 2003). The percentage of people in the United States who speak a language other than English at home grew by 47 percent in the 1990's (Shin & Bruno, 2003). According to the 2000 U.S. Census data, 18 percent of the total population age 5 and older reported speaking a language other than English in their home, with Spanish being the largest of the four major language groups (Shin & Bruno, 2003). Florida is among the top 12 states with highest ELL enrollment in public schools (Migration Policy Institute, 2010). During the 2010-

2011 school year, Hispanics comprised a total of 75.77% of ELLs in Florida (Education Information & Accountability Services, 2011). Out of approximately 243,691 ELLs enrolled in Florida public schools during the 2010-2011 school year, Spanish-speakers comprised the largest native language subgroup with 175,722 students (Florida Department of Education, 2012). The second largest native language subgroup, Haitian-Creole speakers, was comprised of only 26,717 students (Florida Department of Education, 2012). Studies focusing on Florida's Spanish-speaking ELL population are imperative.

The number of ELLs has increased the demand for effective ESL services in schools. ESL services can be comprised of either bilingual or monolingual instructional models. Bilingual models provide native-language support to assist ELLs in acquiring English. Monolingual ESL models include the use of multi-modal instructional techniques which develop language skills through the content curriculum, such as the Cognitive Academic Language Learning Approach (CALLA), within an English-only setting (Cognitive Academic Language Learning Approach, 2012). ESL models designed to meet the needs of Spanish native-speakers are the focus of the present study due to the significant population presence of this population in Florida's public schools (Education Information & Accountability Services, 2011; Florida Department of Education, 2012).

Students whose native language is one other than English often enter our schools with multiple needs in addition to their second-language acquisition needs. Whereas instruction designed to teach English as a second language is critical for this population, a sub-population of linguistically diverse children also enters school in need of effective instruction and intervention for identified or suspected disabilities (Artiles & Ortiz, 2002). In Florida, special education

categories include specific learning disabilities and speech/language impairments, both incorporating language as an area of possible weakness (Florida Department of Education, 2005). It is the legal right of an ELL to receive appropriate ESL instruction even after qualifying for special education services (Artiles & Ortiz, 2002). The 1994 provisions to the Bilingual Education Act emphasized the need for special education staff to attend to issues relating to language maintenance and foreign language instruction (Artiles & Ortiz, 2002). According to the No Child Left Behind (NCLB) Act, public schools must implement programs to close the achievement gap for all children in public schools, including children who are learning English as a second language and children who have disabilities (U.S. Department of Education, 2008b).

Understanding the multiple factors that affect expected gains in student achievement is a critical component of closing the achievement gap for ELLs (De Avila, 1997; Paradis, Crago, Genesee & Rice, 2003). Lack of understanding can lead to disproportionate identification in certain special education programs (Artiles, Rueda, Salazar & Higareda, 2005). Limited research exists on how diversity markers, such as language proficiency and social class, affect an ELL's academic achievement and placement into special education (Artiles et al., 2005). A key component in understanding ESL effectiveness as it relates to ELL subgroups is the inclusion of diversity markers in future research (Articles et al., 2005).

Lack of disaggregated research is an obstacle to designing interventions and instruction intended to improve academic outcomes for the various ELL subgroups as required by NCLB (Artiles et al., 2005; U.S. Department of Education, 2008b). A research synthesis from various academic disciplines is needed. Specifically, studies investigating ELLs with overall language deficits are necessary (Artiles et al., 2005; Paradis, Crago, Genesee & Rice, 2003). Further

research is necessary in regards to the effectiveness of instructional models for ELLs with language-based deficits. This research is critical if local education agencies are to be made accountable for the expected progress of such students. Under NCLB, financial incentives are often contingent on such accountability (U.S. Department of Education, 2007).

Purpose of Study

The purpose of this study is to investigate the conditions which alter the effectiveness of the bilingual ESL model. A Response to Intervention (RtI) service-delivery model requires the implementation of research-based classroom interventions which lead to accountability towards positive student outcomes. It is important to consider the academic needs of ELLs when designing interventions intended to provide data necessary to make informed educational decisions through RtI. This study compares the academic growth and outcomes of ELLs receiving bilingual instruction to the academic growth and outcomes of such students enrolled in classes employing other ESL models that exclusively use monolingual instruction. In order to address the research questions, the researcher analyzed data from the 2010-2011 school year using hierarchical linear regression analysis design. Initial English and Spanish language proficiency were examined as moderating variables. Free/reduced-cost lunch status was included as a control variable. This study can provide a starting point for future research investigating whether ELLs with language deficits respond differently to ESL instruction than students with average to above average language skills. The expectation of this study is that the results will lead to better understanding of effective research-based ESL instruction and interventions for ELLs with varying levels of language proficiency.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

In this section, Response to Intervention (RtI) is discussed as the service-delivery model in education providing the basis for a decision-making process which impacts the educational programming for all students within public schools (Fuchs & Fuchs, 2006). Research regarding second language acquisition and English as a Second Language (ESL) education models is examined in order to understand the impact of educational programming choices for all English language learners (ELL) at Tier I, or the general instruction level, of RtI service-delivery. Furthermore, the common cognitive deficits of ELLs with language-based disabilities are explored in order to define the specific educational needs of ELLs with language deficits. Cognitive load theory (CLT) is proposed as a possible theoretical rationale explaining the reasons that Tier I bilingual ESL instruction may not produce equal outcomes for all ELL students.

Response to Intervention

In order to close the achievement gap among all children, RtI is proposed as the new framework through which educational decisions will be made within our public schools. It is important to note that a shift in terminology from RtI to Multi-Tier System of Supports (MTSS) is emerging (Kincaid & Batsche, 2011). In Florida, the term RtI is still most commonly used to encompass multi-tier evidence-based instruction and data-driven problem solving analysis (Florida Department of Education, 2011). The Individuals with Disabilities Education

Improvement Act (IDEIA 2004) permits school districts to use up to 15 percent of their special education funding for early intervention general education activities related to RtI (Fuchs & Fuchs, 2006). RtI is a frequent topic of focus in the professional literature within the field of education (Fuchs & Fuchs, 2006; Linan-Thompson, Vaughn, Prater, & Cirino, 2006; Rinaldi & Samson, 2008). According to an RtI model, the rate of student progress, based on educational interventions, is measured and analyzed across various levels of intensity (Rinaldi & Samson, 2008).

There are several designs of RtI service-delivery models. However, most common multi-tiered RtI models are based on three levels, or tiers. At Tier I, expected learning progress is analyzed across general, evidence-based instructional programs (Rinaldi & Samson, 2008). ESL model choice can be regarded as a Tier I decision. At Tier II, student progress is analyzed according to expected response to both general instructional programs and additional instruction, such as small-group tutoring (Rinaldi & Samson, 2008). Finally, at Tier III, a student is generally provided intense, one-on-one assistance along with the services provided at Tiers I and II (Rinaldi & Samson, 2008). At this final level of analysis, lack of student progress after attempted interventions can indicate the need for special education services through a structured decision-making process (Fuchs & Fuchs, 2006). A principal component of this analytical and decision-making process across all tiers is both the implementation of interventions that are evidence-based for the population with which they are utilized and the established expected response of a student compared to "true peers," or those peers characterized by similar diversity markers (Fuchs & Fuchs, 2006). Tier I evidence-based instruction is a necessary foundation for

making informed decisions about a student's rate of progress across all three tiers. Thus, Tier I is the focus of the present study.

Unfortunately, the appropriate application of RtI models for identifying students from culturally and linguistically diverse (CLD) backgrounds as students with disabilities is not yet clearly evident (Linan-Thompson et al., 2006). A lack of research exists regarding the efficacy of interventions with ELLs and the response rate of ELLs to intervention and instruction (Linan-Thompson et al., 2006). Additional research identifying the needs of a variety of ELLs must be undertaken. Educators are largely unaware of how second language learning affects CLD children in the classroom. According to a qualitative research study conducted with experienced teachers, 4 out of 6 teachers demonstrated a lack of knowledge regarding second-language learning (Connor & Boskin, 2001). Such lack of knowledge can lead to uninformed Tier I decisions made outside of the scope of existing research foundations. No Child Left Behind (NCLB) 2001 requires research-based educational decision making (U.S. Department of Education, 2008a).

English Language Learners

Title III of the Elementary and Secondary Education Act of 1965, as amended by NCLB 2001, requires that ELLs enrolled in public schools receive appropriate instruction in order to optimize both their language acquisition and academic growth (U.S. Department of Education, 2008a). The process of language acquisition is comprised of stages of language development. As part of these stages, two important types of language proficiencies must be considered: basic interpersonal communication skills (BICS) and cognitive academic language proficiency

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(CALP) (Rhodes, Ochoa, & Ortiz, 2005). While BICS is developed in the earlier stages of second language acquisition, CALP develops after several years of language exposure and is an important factor in academic success (Rhodes, Ochoa, & Ortiz, 2005). It is important to determine CALP levels in a student's native and second languages in order to make educational decisions regarding ESL programming. CALP in a student's native language is a critical component of a student's success in acquiring CALP in a second language (Rhodes, Ochoa, & Ortiz, 2005). For this reason, this study will consider a student's language proficiency in both their native and second languages as important factors impacting academic success through Tier I RtI. It is important to understand ESL instruction and the various Tier I models available due to the significant impact of ESL model choice on a student's acquisition of CALP (Rhodes, Ochoa, & Ortiz, 2005).

An ELL's attainment of CALP may also be influenced by factors external to the process of second language acquisition. Previous research suggests that socioeconomic status is a significant factor impacting children's vocabulary attainment (Hoff, 2003). Differences in the quantity of speech, lexical richness and sentence complexity of mothers' speech to their children may be sources of socioeconomic related differences in student's initial language proficiency upon enrolling in Kindergarten (Hoff, 2003). The detrimental impact of poverty is markedly higher for families of generational poverty, often defined as poverty for two or more generations, than for families of situational poverty, poverty generally attributable to a temporary set of events (Payne, 2005). Free/reduced-cost lunch status, often utilized as a diversity marker representing socioeconomic status (Artiles et al., 2005), includes families of generational and of situational poverty.

English as a Second Language Instruction

Within RtI, a student's performance and learning rate is compared to the expected performance of other students (Fuchs & Fuchs, 2006). It is necessary to fully understand the effectiveness of various models of ESL instruction in order to make research-based Tier I decisions for ELLs. If an ELL's needs are not addressed by the general education program, school professionals must first identify whether additional English language strategies should be attempted prior to considering a student for disability diagnosis (Rinaldi & Samson, 2008). A failure to identify needs and intervene in a timely fashion at the Tier I general education level, not the presence of a disability, may be the real source of student difficulties (Garcia & Ortiz, 2006). It is critical to determine if the expectations of progress within various models of ESL instruction should be the same regardless of whether an ELL displays adequate levels of language proficiency or whether he or she demonstrates language proficiency deficits (Artiles et al., 2005). If expectations must differ, the decision-making process, including recommended instruction and intervention, within RtI must also differ.

Historically, the Bilingual Education Act of 1968 provided impetus for a national introduction of bilingual programs into educational curriculum (Baker, 2001). In 2001, NCLB re-authorized the use of English-only programs and emphasized that best practices for literacy development in monolingual children can and should be applied to all children regardless of linguistic background (Fitts, 2005). NCLB reversed the impetus for bilingual programs that the Bilingual Education Act of 1968 created. Thus, recent efforts have focused on encouraging instruction which develops stronger English oral language proficiency (Center for Applied

Linguistics, 2006). This instruction, due to NCLB, is often assumed by educators to be monolingual, English-only programs.

As a review of the history of ESL programming reveals, Tier I decisions about ESL models have been generally based on federal mandates leading to a "one-size-fits-all" approach (Baker 2001; Center for Applied Linguistics, 2006; Fitts, 2005). Due to the varying designs of each model, such broad assumptions about educational programming are unlikely to result in effectiveness for all of the populations for which they are intended. In order to understand the alternatives in teaching linguistically diverse children within our schools, it is imperative to understand the various Tier I ESL models that exist in the professional literature. Each of these models varies in its goal and design, making it unique in its applicability to varying interactions of contextual factors.

Model overview. Six ESL models are commonly discussed in Teaching English to Speakers of Other Languages (TESOL) professional literature: 1) Submersion, 2) ESL Pull-Out, 3) Sheltered English, 4) Transitional Bilingual Education, 5) Maintenance Bilingual Education, and 6) Two-Way Bilingual Education (Roberts, 1995). As illustrated in Figure 1, ESL models can be further divided between models that provide instruction in two languages, bilingual models, and those that provide instruction in one language, monolingual models. Due to such variations among models, the impact of instructional programming for an ELL at Tier I of RtI can be significantly different, depending on both the model chosen and the student's individual characteristics. Student demographics, such as learning needs and initial language proficiency in both the native and second language, must be taken into consideration when a decision about

ESL model is made. Research analyzing how ESL model effectiveness varies based on these student demographics is lacking.

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│  ESL Model Overview │
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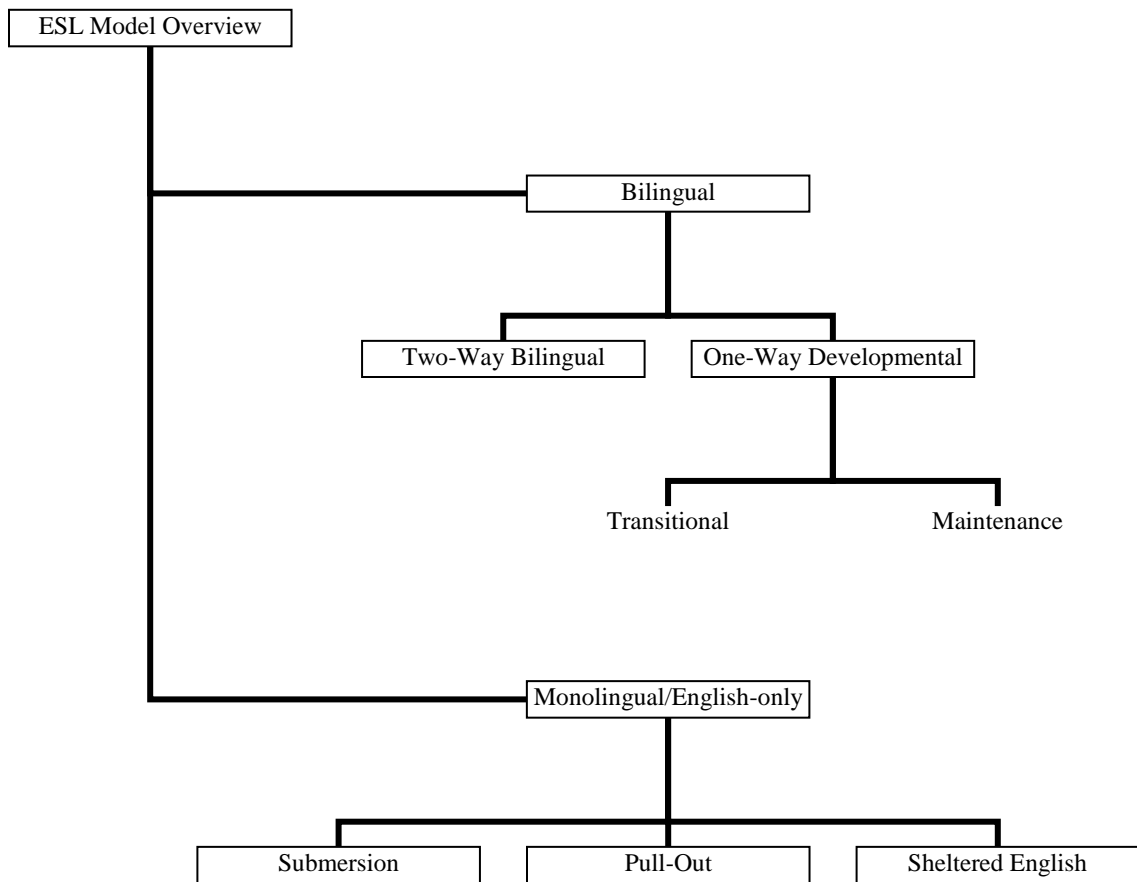
Figure 1: *English as a Second Language (ESL) Model Overview*

Bilingual education models. Three models of ESL education provide bilingual Tier I instruction: a) Two-Way Bilingual Education, b) Transitional Bilingual Education, and c) Maintenance Bilingual Education (Roberts, 1995). A Two-Way model focuses on the goal of developing bilingual and bicultural children through constant and even bilingual instruction.

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Transitional and Maintenance models, also referred to as a One-Way Developmental model, use a student's native language to facilitate the development of proficiency in a second language. The Transitional model uses a combination of first and second language support to transition an ELL to mainstream English classrooms within 2 to 3 years (Rhodes, Ochoa, & Ortiz, 2005). The Maintenance model typically expects this transition to occur in a period of 4 to 6 years (Rhodes, Ochoa, & Ortiz, 2005). Some researchers consider the Transitional and Maintenance models of bilingual instruction to be subtractive, or designed to assist students who are monolingual in becoming monolingual in another language (Roberts, 1995).

Monolingual education models. Outside of bilingual instruction, three additional English-only ESL models exist: 1) Submersion, 2) Pull-Out, and 3) Sheltered English. In the United States, the Sheltered English and Pull-Out models are both viewed as alternatives to bilingual education. They both provide Tier I ESL services through English-only, monolingual instruction (Rhodes, Ochoa, & Ortiz, 2005). A Pull-Out model provides English language instruction for a short portion of the instructional day outside of the mainstream classroom (Roberts, 1995). In a Sheltered English model, students are provided with in-classroom Cognitive Academic Language Learning Approach (CALLA) support and accommodations, such as gestures and physical cues, to facilitate language acquisition throughout the instructional day (Rhodes, Ochoa, & Ortiz, 2005). CALLA assists an ELL in developing language proficiency through content area vocabulary instruction and support (Cognitive Academic Language Learning Approach, 2012).

Effectiveness of English as a Second Language Models

The six models of ESL instruction vary in effectiveness according to the level of native or first language support they provide, ranging from monolingual, English-only instruction to bilingual instruction. A large amount of research exists in regards to the effectiveness of each of these models in teaching ESL and developing CALP at Tier I of RtI for general education ELLs (Flood, Lapp, Villamil Tinajero, & Rollins Hurley, 1997; Thomas & Collier, 1997). The outcomes of general education students within each of these models vary greatly, with bilingual instructional models, both Two-Way and One-Way, consistently producing the highest student outcomes when compared to English-only ESL models (Flood, Lapp, Villamil Tinajero, & Rollins Hurley, 1997; Thomas & Collier, 1997). The research literature in the TESOL field indicates that bilingual models hold the key to positive student outcomes in regards to CALP development and overall academic achievement (Rhodes, Ochoa, & Ortiz, 2005). Results of a series of 4 to 8-year longitudinal studies on bilingual education models, implemented with fidelity, indicate that it is the model with the most positive long-term outcomes for students (Thomas & Collier, 1997). Generally, students who enter a Two-Way model in Kindergarten and can continue until 12th grade demonstrate, by middle school, higher academic performance on standardized tests than even their monolingual English-speaking peers in the general classroom (Thomas & Collier, 1997). Studies demonstrate that the long-term outcomes of students enrolled in a Maintenance model of bilingual education are superior to the outcomes of students instructed through Submersion, Pull-Out, Sheltered English, or Transitional models (Thomas & Collier, 1997). In summary, bilingual education models, especially a Two-Way model, are generally regarded as more effective than English-only models.

Disaggregating ELL data based on diversity markers and ELL subgroups is important in future TESOL research (Artiles et al., 2005). Current data do not demonstrate that all forms of bilingual education are superior to any form of English-only instruction for all ELLs (Cummins, 1998). Professional literature analyzing these instructional models in the TESOL field does not often include the implementational context, such as student demographics. These factors can vary from one district and community to another and from one student to another. Expansion of current research is necessary because available research regarding the effectiveness of bilingual ESL models does not disaggregate contextual data, such as student disabilities and language deficits. This oversight distances theory from practice and complicates generalizability of results making ESL instruction "less conscious of implementational feasibility" (Hlebowitsh, 1999, p. 348).

It is problematic to generalize research regarding the effectiveness of these ESL models from general education students to students with disabilities or students with language-based deficits. Only a few researchers explore this topic and quantitative research on such a topic is largely unavailable. According to Thordardottir (2006), bilingualism is an attainable goal for all children, even those with disabilities. Research conducted on children with Down Syndrome indicates that there is no evidence of a detrimental effect of bilingualism on this population (Bird, Cleave, Trudeau, Thordardottir, Sutton, & Thorpe, 2005). Some believe that bilingual instruction extends, rather than limits, linguistic resources, and can thus facilitate language development (Gutierrez-Clellen, 1999). For ELLs with language-based disabilities, a sequential approach to ESL, which relies on a student's native language for a pre-determined period of time before introducing a second language, is recommended (Artiles & Ortiz, 2002). However, the

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research evidence for such a recommendation is unclear. On the other hand, Paradis et al. (2003) state that many believe bilingual instruction decelerates language development in ELLs with disabilities. Although the research literature provides evidence that bilingual education may be the most effective model in leading to positive student outcomes for general education students at Tier I of RtI model, conclusive evidence regarding the effectiveness of this model for ELLs with language-based deficits is lacking.

English Language Learners with Language-Based Disabilities

The Communication Disorders field focuses on research relevant to speech-language pathologists, which specialize in instruction and intervention for students with language deficits (Staskowski & Rivera, 2005). As previously stated, an investigation of language deficits within the context of ESL instructional models at Tier I of RtI is necessary. Due to the lack of disaggregated data based on language proficiency available within the TESOL field, the field of Communication Disorders provides a starting place for an investigation of the needs of ELLs with language deficits. The following review of such research provides a definition of language impairments and an overview of cognitive processing deficits typically observed in language impaired students. Finally, the recommendations and trends in language choice for the speech-language clinical treatment of such students are presented.

Language Impairment

Language impairment is a developmental condition in which a child fails to develop language at a typical rate (Archibald & Gathercole, 2007). Despite normal intellectual abilities,

adequate exposure to language, and the absence of hearing impairments, these children

demonstrate language development delays (Archibald & Gathercole, 2007). This definition can

be applied to most language-based disabilities, including specific learning disabilities identified

in the area of oral language. Significant cognitive processing deficits can be identified in

children with language-based disabilities. Cognitive processing deficits can negatively impact

the informational processing and learning rate of children with disabilities. These cognitive

processing deficits can be measured across various areas, both linguistic and non-linguistic.

Such impact creates the necessity to consider the unique needs of students with language-based

deficits in a classroom when defining Tier I expectations for academic growth and progress.

Cognitive Processing Deficits in Language Impaired Children

Archibald and Gathercole (2007) investigated language-based cognitive processing in

school-age children. Through their research, Archibald and Gathercole (2007) demonstrated

that, compared to typically developing children, the processing deficits of language impaired

children include deficits in complex processing activities. Specifically, children with language

impairments demonstrate significant difficulties maintaining and working with verbal

information while engaged in any type of concurrent information processing (Archibald &

Gathercole, 2007).

Other cognitive processing deficits commonly found in children diagnosed with

language-based disabilities include general working memory deficits and processing speed

deficits. ELLs with language impairments demonstrate lower performance on working memory

tasks compared to non-language impaired monolingual and bilingual children (Archibald &

Gathercole, 2007; Danahy, Windsor, & Kohnert, 2007). These children also demonstrate lower performance on tasks measuring phonological working memory (Coady & Evans, 2008). Additionally, deficits in speed of processing can also impact the information processing of children with language impairments (Archibald & Gathercole, 2007; Leonard, Weismer, Miller, Francis, Tomblin & Kail, 2007).

Clinical Treatment Models for English Language Learners with Language Disorders

Research within the field of Communication Disorders includes investigation of the effective treatment of ELLs with language disorders (Paradis et al., 2003). Bilingual speech and language pathologists generally advocate for intervention and therapy in the home language for linguistically diverse students with language impairments (Kohnert, Yim, Nett, Fong & Duran, 2005). These recommendations are often based on the value of maintaining the home language and cultural diversity for CLD students. Few research studies attempt to systematically and quantitatively examine the effect and cost of maintaining bilingualism for language impaired students in regards to the impact of their cognitive processing deficits on learning.

Though many believe that learning two languages may negatively impact students with language impairments, longitudinal data collected over a 2 year period indicates that bilingual children with language impairments show the same deficits as monolingual children with language impairments (Paradis et al., 2003). While promising, these results are interpreted cautiously, as the authors state that further research in this area is necessary and critical (Paradis et al., 2003). These research results imply that second-language learning does not negatively

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impact children with language impairments, although studies duplicating these results are still sparse.

An extensive literature review is available regarding relevant research conducted on the language development of preschool children, ages 2 to 5, identified as language impaired (Kohnert et al., 2005). These studies reveal findings related to: a) reasons to support native language development in schools, b) the impact that supporting a student's native language has on their second-language development, c) code-switching, and d) interventions related to supporting native language. Kohnert et al. (2005) conclude that neglecting to support native language development can negatively impact a student's social, emotional, and academic development. Family dynamics can also be negatively affected by the deterioration of native language skills, due to a decreased use of the common language of communication between family members (Kohnert et al., 2005).

Two models for providing speech and language services to ELLs with language impairments have been proposed: a) Bilingual Approach and b) Cross-Linguistic Approach (Goldstein & Fabiano, 2007). The Bilingual Approach indicates that speech and language pathologists should increase language skills common to both languages in therapy with ELLs with language impairments (Goldstein & Fabiano, 2007). In contrast, using the Cross-Linguistic Approach, a speech and language pathologist will focus on improving language skills unique to each language (Goldstein & Fabiano, 2007). It is recommended that therapists design therapy sessions using a combination of these two approaches, depending on the individual needs of the child (Goldstein & Fabiano, 2007). Both the Bilingual Approach and the Cross-Linguistic approach to therapy require the presentation of bilingual information. Thus, in the field of

Communication Disorders, research results generally support the recommendation that a variety of bilingual speech and language therapy services be provided for ELLs with language impairments. However, the theoretical framework of the research supporting either of the speech and language therapy models for ELLs with language impairments is generally not based on an analysis of cognitive processing deficits and how these deficits may increase a student's cognitive load.

Implications of Cognitive Load Theory for English as a Second Language Instruction

According to RtI, educational decisions are to be made based on individual student response to research-based instruction and intervention. Therefore, student expectations for academic progress and response must be examined carefully. CLT provides a theoretical orientation for such an exploration. For children with learning deficits, educators must find the most efficient and effective way to enhance learning and classroom performance at Tier I. Although research studies on the topic of cognitive load have previously examined language development, little analytic attention has been paid to second language acquisition. A recent study investigating cognitive factors concluded that both ELLs and monolingual learners demonstrate higher information retention in a cognitively low-demanding environment (Farris, Trofimovich, Segalowitz & Gatbonton, 2008). The current study's theoretical framework assumes that CLT be further extended to analyze the instructional needs of ELLs with language-based deficits at Tier I of RtI. Such an extension is lacking in the research literature.

Cognitive Load Theory Overview

CLT is based on the theory of cognitive information processing within the field of Educational Psychology. Cognitive information processing theory attempts to explain how a learner processes new information in order to store it in long-term memory and later retrieve it. According to Gredler (2005), the most dominant perspective on the process of human cognition is the multi-stage model of cognitive information processing. Generally, this model describes three main structures of human memory: the sensory registry, short-term storage/working memory, and long-term memory. Initially, the sensory registry filters input through focusing attentional resources. Information that has been attended to must then be processed through working memory before it can be stored in long-term memory. Storage into long-term memory can be considered learning (Gredler, 2005).

CLT proposes that processing limitations in working memory cause cognitive overload which, in turn, greatly impacts learning and classroom performance (Kalyuga, 2007a). While long-term memory does not appear to have capacity limitations, the structure of working memory restricts the amount of input into long-term memory through its own limitations in capacity and duration (Kalyuga, 2007a). Effective information processing through attentional resources and the stage of short-term memory is a pre-requisite for long-term memory storage and learning (Gredler, 2005). Tier I learning environments which increase cognitive load can negatively impact learners, decreasing their retention of information. It is important to understand which type of cognitive loads are said to negatively impact learning before this theoretical orientation can be applied to the current topic of interest, the learning process of ELLs with language-based deficits at Tier I RtI.

Types of cognitive loads. According to CLT**,** three types of cognitive loads exist: a) germane, b) extraneous, and c) intrinsic (Paas, Renkl, & Sweller, 2003). While germane cognitive load is related to instructional design and environment, it can be considered positive because it enhances learning through an increase in motivation and student engagement in a task (Paas, Renk, & Sweller, 2003). Thus, germane cognitive load is not considered problematic at Tier I.

The other types of cognitive load are said to negatively impact learning at Tier I of RtI. Extraneous cognitive load can be considered negative, but its interference with learning is due to the manner with which information is taught, not to the demands of the information itself (Paas, Renk, & Sweller, 2003). Although this type of cognitive load interferes with learning at Tier I, it is not proposed as relevant to ESL models due to its reference solely to a teacher's techniques. Finally, intrinsic cognitive load is created by learning material that places significant demand on the capacities of working memory due to its intrinsic qualities (Paas, Renk, & Sweller, 2003). This type of cognitive load is due to the interactivity of the inherent elements of the material being learned (Paas, Renk & Sweller, 2003). Intrinsic cognitive load is assumed to negatively impact learning due to its interference with cognitive processing. Based on this previous research, the current researcher assumes that a bilingual curriculum creates an intrinsic cognitive load for ELLs with language-based deficits.

Cognitive Load and Language Deficits

Cognitive load research has been applied to many areas, including language learning. In its application to language learning, researchers have proposed that the verbal storage capacity of

short-term memory can be separated into lexical-semantic memory and phonological memory (Belke, 2008). Working memory loads render the capacity of retrieval from lexical-semantic memory less efficient (Belke, 2008). Demands placed on working memory can create difficulties in the retrieval of verbal meaning, affecting academic skills such as reading comprehension and oral language receptive skills. Therefore, an increase in cognitive load related to working memory capacity can impact the acquisition of language. This can have significant implications for educators who seek to optimize a learner's language acquisition.

Montgomery and Evans (2009) investigated the verbal comprehension of language impaired versus typically-developing peers. In their discussion of results, Montgomery and Evans (2009) suggest that processing difficulties found in children diagnosed with language impairments stem from limitations in working memory and their attentional resource capacity and allocation mechanism. These results, interpreted through CLT, suggest that complex verbal information increases the cognitive load of students with language-based disabilities to a greater extent than for typically developing peers. This increase in cognitive load causes a decrease in attentional resources necessary in order to filter information through the sensory registry and process information through short-term memory.

Research Synthesis

As previously discussed, children with language limitations can exhibit significant cognitive processing deficits in the area of verbal processing, working memory, and processing speed (Archibald & Gathercole, 2007; Coady & Evans, 2008; Danahy, Windsor, & Kohnert, 2007; Leonard et al., 2007). Thus, an instructional day comprised of presentation of information

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in two languages may create significant intrinsic cognitive load for students who do not demonstrate proficiency in any language. While bilingual instruction may prove extremely beneficial to a typically developing student, a student with language proficiency deficits may demonstrate lack of progress not only due to his or her possible cognitive processing deficits as learners but also due to the complex nature of the instructional material being provided.

While previously mentioned research indicates that bilingual instruction improves, rather than limits, the outcomes of regular education students (Flood et al., 1997; Rhodes, Ochoa & Ortiz, 2005; Thomas & Collier, 1997), it is important to understand how cognitive deficits unique to children with language-based deficits make the results of studies on the effectiveness of bilingual education difficult to generalize to such a population. Monolingual instruction may be preferable for ELLs with overall language-based deficits as they enter public schools. The learning difficulties ELLs with language-based deficits experience at Tier I may be exacerbated in a bilingual setting due to an increase in the complexity of verbal stimuli. These difficulties may be due to subtle inefficiencies in their cognitive processing mechanisms when compared to average peers (Kohnert et al., 2005). The impact that these cognitive deficits have on ELLs with language-based deficits can have far-reaching effects, especially when their learning progress is being measured within the context of their response to instruction and interventions, or RtI. This makes ESL model choice a critical decision at Tier I RtI due to the impact it may have on the learning capacity of certain subgroups of ELLs that require specialized instruction designed to optimize their cognitive processing of information.

Limitations of Theoretical Framework

It is important to consider limitations to the current research framework. CLT research indicates that the quality of learner outcomes depends largely on the assessment of learner expertise level in regards to specific skills (Kalyuga, 2007b). The current theoretical framework assumes that ELLs with limited language proficiency in their native language are novices in learning verbal material in the general classroom. Another assumption is that bilingual input can be considered complex verbal input. However, the verbal input in a bilingual ESL model, which utilizes students' dominant or native language, may be less complex than the input in a monolingual setting, in which only their second-language is utilized. If higher levels of expertise decrease cognitive load (Kalyuga, 2007b), then cognitive load for an ELL with disabilities may possibly decrease when their dominant language is used during instruction.

One of the most important questions still left to be answered by research in the TESOL field refers to factors that affect choice of language and methods for initial literacy instruction (Duff & Bailey, 2001). Such choice can greatly impact a student's academic growth at Tier I of RtI. The results of this study may lead to better understanding of effective, research-based Tier I instruction for ELLs with varying levels of language proficiency. Regardless of aforementioned limitations, the present study attempts to integrate research from multiple academic disciplines in order to answer the research question: Is the effectiveness of the bilingual ESL model significantly altered under certain conditions?

CHAPTER 3: METHODOLOGY

Participants

Demographics

The population of interest for this study was English language learners (ELL) enrolled in English as a Second Language (ESL) instruction. The researcher chose Florida as the target state for the study sample due to its large ELL population (Migration Policy Institute, 2010). With 226,157 ELLs enrolled in Florida public schools during the 2008-2009 school year, Florida had the third highest number of ELL enrollment in the United States (Education Information & Accountability Services, 2011). Because the majority of ELLs in Florida, 175,722 out of 243,691, listed Spanish as their native language during the 2010-2011 school year (Education Information & Accountability Services, 2011; Florida Department of Education, 2012), this study focused solely on Spanish speaking ELLs. The selected site for this investigation was a large Central Florida public school district due to its large ELL population and variety in ESL model programming. Total student membership for the participating public school district during the 2010-2011 school year was 175,986 students, with a total of approximately 28,252 students categorized as ELLs (Education Information & Accountability Services, 2011). The total number of Kindergarten students enrolled within the Florida school district chosen for this study was 13,914, with 4,976 of those students categorized as Hispanic (Education Information & Accountability Services, 2012).

Sampling Techniques

The researcher employed a purposive sampling technique. The study sample was comprised of Hispanic ELLs attending Kindergarten within a large public school district in Central Florida during the 2010-2011 school year. The district was chosen both for its variety in ESL programming and for its diverse demographics. SAS Software was used for power analysis. According to the SAS analysis, 75 participants in each group of interest was the minimum acceptable number of participants to detect a difference between the false value of .20 for each variable and the true value of .30 with power .80 (80% accuracy).

A choice of ESL model was available to the parents of all ELLs in the district through a feeder pattern providing transportation to several center schools. The 2010-2011 school year feeder pattern designated a total of 15 ESL center elementary schools across the district, each containing both a One-Way Developmental classroom and a Sheltered English classroom (Multilingual Student Education Services, 2008). The study purposely sampled Kindergarten Hispanic ELLs from two groups of interest during the 2010-2011 school year: 1) Students receiving ESL instruction through a One-Way Developmental model (Bilingual), and 2) Students receiving ESL instruction through a Sheltered English model (English-only).

Steps were taken to ensure consistency in educational experiences within the two groups sampled. The researcher utilized fidelity observations as the best evaluation of quality of instruction across the 15 ESL center schools. Throughout the 2010-2011 school year, instructional fidelity checks were conducted through classroom observation by staff from the Multilingual Student Education Services department (M. Mejia, personal communication, February 6, 2012). This ensured district-wide ESL model consistency despite classroom level

variability in teacher training and years of experience. Additionally, since mobility rate is often

high for ELLs (McCardle, Mele-McCarthy, Cutting, Leos, & D'Emilio, 2005), the researcher

focused on the ESL entry year, Kindergarten. Focusing on Kindergarten minimized the potential

variability in previous school mobility rates for the students included in the sample. This

researcher was unable to use data for students who moved to another school at any point during

the 2010-2011 school year due to an assumed lack of consistent instruction. All scores for

students not impacted by school mobility were used within each group. District-wide adherence

to each ESL model's instructional design and a minimization of variability in student history of

school mobility allowed the researcher to validly assess the effectiveness of each ESL model

type.

Measures

The researcher utilized data from three different benchmark assessments routinely

administered by the district as part of the analysis of this study. The three different measures are

all standardized and norm-referenced tests. These measures provided continuous data regarding

each participant's oral language and early literacy academic skills. Oral language skills were

measured in English and in Spanish for all participants. Academic skills were measured in

English for all participants. It is important to indicate that a notable lack of publicly available

information regarding psychometric properties beyond reliability data exists for many ELL

proficiency measures (Wolf et al., 2008). Research is still needed in this area due to the

complexity of the concept of language proficiency and the difficulties of psychometrically

measuring this proficiency (Wolf et al., 2008).

Pre- Language Assessment Scale 2 (preLAS-2)

     Description. Spanish-speaking ELLs enrolling in Kindergarten for the first time during the 2010-2011 school year were administered the Pre-Language Assessment Scale 2 (preLAS-2) in both English and Spanish at the beginning of the school year as part of district-wide Multilingual Student Education Services department procedures (Multilingual Student Education Services, 2008). Each participant's total oral language score on both the English and Spanish measures was included as a continuous variable to measure initial English and Spanish language proficiency upon Kindergarten enrollment. Based on test norms, the preLAS-2 categorizes a student's language levels as Fluent Speaker, Limited Speaker, or Non-Speaker in English and also in Spanish (Duncan & DeAvila, 2000). A Fluent Speaker group is defined as participants obtaining a preLAS-2 raw score of 82 or above (Duncan & DeAvila, 2000). A Limited Speaker group is defined as participants obtaining a preLAS-2 raw score of 62-81 (Duncan & DeAvila, 2000). A Non-Speaker group is defined as participants obtaining a preLAS-2 raw score of 61 or less (Duncan & DeAvila, 2000).

     Reliability and validity. The preLAS-2 is a standardized instrument utilized as a language proficiency screening (Duncan & DeAvila, 2000). The instrument is a reliable, nationally-normed instrument consistent with the recommendations of the American Psychological Association standards for test development (Duncan & DeAvila, 2000). It is valid for use with ELLs (Duncan & DeAvila, 2000). During the 2010-2011 school year, teachers or certified staff administering the preLAS-2 were trained by the district's Multilingual Student Education Services department in order to ensure standardization of test procedures according to

preLAS-2 guidelines (Multilingual Student Education Services, 2008). This training consisted of a minimum of a half day workshop (M. Mejia, personal communication, February 6, 2012).

Comprehensive English Language Learning Assessment (CELLA)

Description. The Comprehensive English Language Learning Assessment (CELLA) is an English standardized measure utilized to measure ELLs' academic outcomes annually using four different constructs: 1) listening, 2) speaking, 3) reading and 4) writing (Educational Testing Service, 2010a). In Florida, yearly administration of the CELLA is legally mandated of all ELLs in order to "progress monitor" academic growth in English (Bureau of Student Achievement Through Language Acquisition, 2010). Kindergarten students are administered the CELLA Level A individually at the end of each school year (Educational Testing Service, 2010a). During the 2010-2011 school year, the CELLA state-wide administration window began April 19, 2011 and continued until May 19, 2011 using Form 1 (Educational Testing Service, 2010b). In order to measure academic skills for the current research study, each participant's CELLA Listening/Speaking score and CELLA Reading score were utilized as an outcome measure of Kindergarten academic achievement.

Reliability and validity. CELLA was developed through a U.S. Department of Education grant and field tested for reliability and validity by Educational Testing Service in five states: Florida, Maryland, Michigan, Pennsylvania, and Tennessee (Educational Testing Service, 2005). ELLs selected for field testing samples varied widely in native language spoken and proficiency levels in order to ensure a representative sample (Educational Testing Service, 2005). According to an analysis of item statistics completed during field testing, the range of internal

consistency of test items on each section of the CELLA is satisfactory for each of the following sections of the test: 1) Listening Cronbach's alpha coefficient = 0.78-0.90, 2) Speaking Cronbach's alpha coefficient = 0.85-0.95, 3) Reading Cronbach's alpha coefficient = 0.77-0.89, and 4) Writing Cronbach's alpha coefficient = 0.91- 0.95 (Educational Testing Service, 2005). During the 2010-2011 school year, district procedures required ESL classroom teachers and certified staff to administer the CELLA after a training provided by the district's Multilingual Department to ensure standardized test procedures (Multilingual Student Education Services, 2008). This training consisted of a minimum of a half day workshop (M. Mejia, personal communication, February 6, 2012).

Florida Assessments for Instruction in Reading (FAIR)

Description. The Florida Assessments for Instruction in Reading (FAIR) standardized tests assess early reading skills and are administered three times a year (Carlson et al., 2010). At the Kindergarten level, students complete a Broad Screen which is used to calculate success the Probability of Reading Success score, or PRS (Carlson et al., 2010). As part of reading progress monitoring efforts across the selected school district during the 2010-2011 school year, Kindergarten teachers measured the reading achievement of students using FAIR in Fall, Winter and Spring. Therefore, three repeated measures progress monitoring data points were available per participant for the current research study using the FAIR PRS score as a measure of reading growth.

Reliability and validity. Test-retest reliability results for the FAIR Broad Screen are generally in the moderate range due to expected increases from learning growth over time

(Carlson et al., 2010). The Broad Screen's negative predictive power for Assessment Period 1 was measured at or above 85%, and at 81% and 79% respectively for Assessment Period 2 and 3 (Carlson et al., 2010). The PRS attempts to predict the probability of a student scoring at or above the 40th percentile on end-of-year tests (Carlson et al., 2010). In general, psychometric evidence supports the test's reliability and validity for use with Kindergarten students as a means of measuring early reading skills (Carlson et al., 2010). Classroom teachers administer this assessment following training provided by the Florida State Department of Education to ensure standardized testing procedures (Carlson et al., 2010). This training consists of a minimum of two full-day workshops (C. Cardenas, personal communication, January 27, 2012).

Procedures

Non-Human Research Design

The design was approved as non-human research design on 02/16/2011 and thus exempt from Institutional Research Board (IRB) review. This researcher met with the district's Multilingual Student Education Services Directors to request their participation in the study. After receiving verbal support from district leaders, the researcher applied for approval of the research proposal from the district's Department for Accountability, Research, and Assessment. District research approval was granted on 04/11/2011. Specifically, the student-level cross-sectional historical data to be obtained for this study were limited to: 1) Free/reduced-cost lunch status, 2) ESL model enrollment, 3) English preLAS-2 scores, 4) Spanish preLAS-2 scores, 5) CELLA Listening/Speaking scores, 6) CELLA Reading scores, and 7) FAIR PRS scores. The

diversity markers free/reduced-cost lunch and language proficiency were chosen for this study

due to previous research indicating their significance when disaggregating ELL data (Artiles et

al., 2005). Due to a lack of research evidence supporting its correlation with an ELL's early

academic development, gender was not included as part of the data collected (Medina &

Escamilla, 1994; Tong, Irby, Lara-Alecio, & Mathes, 2010). Ethnicity was also not included as

collected data based on the design's sole focus on the Hispanic target population.

During June 2011, district staff from the Multilingual Student Education Services

department collected the requested cross-sectional data from district-wide databases. No other

individuals were responsible for the data collection to ensure confidentiality. The data were

collected using a separate Microsoft Word sheet per classroom. The researcher was provided

this data void of any identifying information to ensure a non-human subjects research design.

The data set was not provided to the researcher until available in its entirety so that student

names or identification numbers were unnecessary for data-coding. Coding into Statistical

Package of Social Science (SPSS) software was organized using separate columns per variable

and 1 row per anonymous participant.

Variables

The hierarchical linear regression study design included one independent variable, two

moderator variables, a control variable, and three dependent variables. Categorical variables

were coded using dummy coding, or a 0 to 1 dichotomy corresponding to the variable levels.

ESL model (ESLModel) was included as the categorical independent variable. This variable was

considered the predictor variable, or the variable which was assumed to explain student

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achievement. ESLModel was comprised of two levels, English-only and bilingual. English-only referred to students enrolled in a Sheltered English ESL model. Bilingual ESL model was defined as a One-Way Developmental model.

A moderator variable is said to look beyond basic research questions and "address 'for whom' a variable most strongly predicts or causes an outcome variable (Frazier, Tix, & Barron, 2004). Of interest were the following moderating variables: 1) initial English language proficiency (InitialENG) and 2) initial Spanish language proficiency (InitialSPA). The variable initialENG was continuous, comprised of participant's English language raw score on the preLAS-2. The variable initialSPA was also a continuous variable consisting of participant's Spanish language raw score on the preLAS-2. Free/reduced-cost lunch status (F/RLunch) was included as a control variable to determine the effects of socio-economic status. The variable F/RLunch was a categorical variable containing two levels, Yes or No.

Three continuous dependent variables were considered in order to measure academic growth and outcomes during Kindergarten: 1) FAIR Growth (FAIRGrowth), 2) CELLA Listening/Speaking score (CELLAListSpk), and 3) CELLA Reading (CELLAReading) score. FAIRGrowth was calculated by subtracting a student's beginning-of-year FAIR PRS (FAIR 1) score from the end-of-year FAIR PRS (FAIR 3) score. While CELLAListSpk and CELLAReading were indicative of level of attained skill proficiency, FAIRGrowth was included as an indicator of learning growth regardless of proficiency level.

Statistical Analysis

The investigator analyzed the cross-sectional data through hierarchical linear regression with moderating variables. Individual data points for each participant meeting inclusion criteria were compiled into a SPSS database. No identifying information was contained within the SPSS database or analysis of the results. Frazier, Tix, and Barron's (2004) guidelines for using hierarchical multiple regression procedures to detect moderator effects were followed.

As a first step, the variables InitialENG and InitialSPA were centered, or standardized, according to Fraxier, Tix, and Barron's (2004) recommendations for centering all predictor and moderator variables measured on a continuous scale. The predictor ESLModel was measured on a categorical scale and did not require centering. To center variables using SPSS, a mean score was calculated for each variable and then subtracted from each participant score. Thus, a score of 0 was indicative of an average score, a positive score indicated above average performance and a negative score indicated below average performance. Centering reduces possible multicollinearity among the variables in the regression (Frazier, Tix, & Barron, 2004).

Following the centering of InitialENG and InitialSPA, product terms were created. Product terms represent the interaction between a predictor and a moderator (Frazier, Tix, & Barron, 2004). The predictor ESL Model was multiplied with each centered moderating variable to create the product terms representing interaction effects. Thus, the product terms created were ESLModel x InitialENG (ESLEINT) and ESL Model x InitialSPA (ESLSINT). The hierarchical regressions were completed in four steps. At Step 1, the control variable was included to account for its impact on the dependent variable. At Step 2, the predictor ESLModel was added. Step 3 accounted for initial English or Spanish language proficiency. At Step 4, the researcher

determined whether the interaction product terms significantly explained any additional variance in the dependent variable.

The research question was as follows: Is the effectiveness of the bilingual ESL model significantly altered under certain conditions? The following research hypotheses were formed based on this research question:

H1. Initial English language proficiency will be a significant moderating variable impacting the relationship between ESL Model and FAIR Growth

H2. Initial Spanish language proficiency will be a significant moderating variable impacting the relationship between ESL Model and FAIR Growth

H3. Initial English language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Listening/Speaking score

H4. Initial Spanish language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Listening/Speaking score

H5. Initial English language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Reading score

H6. Initial Spanish language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Reading score

CHAPTER 4: RESEARCH RESULTS

Introduction

The purpose of this chapter is to present the results of the analysis of the conditions which alter the effectiveness of a bilingual ESL model. The following research results are based on output from the statistical software Statistical Package of Social Science 19 (SPSS). The first section discusses participant demographic information, such as ESL model enrollment distribution and free/reduced-cost lunch status. The following sections attempt to address each of the hypotheses listed below through separate hierarchical linear regressions:

H1. Initial English language proficiency will be a significant moderating variable impacting the relationship between ESL Model and FAIR Growth

H2. Initial Spanish language proficiency will be a significant moderating variable impacting the relationship between ESL Model and FAIR Growth

H3. Initial English language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Listening/Speaking score

H4. Initial Spanish language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Listening/Speaking score

H5. Initial English language proficiency will be a significant moderating variable impacting the relationship between ESL Model and CELLA Reading score

H6. Initial Spanish language proficiency will be a significant moderating variable

impacting the relationship between ESL Model and CELLA Reading score

Descriptive Information

The entire data set was initially screened for missing data. Missing data for a particular student could indicate school mobility or poor attendance during the school year. Therefore, any student with a missing test score was excluded from the research database. After this initial screening, the number of participants was 407 ($n = 407$). The researcher then conducted general data screening procedures using SPSS to identify and exclude significant outliers. Significant outliers were defined as scores outside of the possible results range specified by the test publishers for each of the continuous variables. These were likely due to data input errors rather than actual student performance. After this secondary screening, the number of total participants decreased to 403 ($n = 403$).

Descriptive information for the research sample is displayed in Table 1. A large difference was noted in the number of ELLs in the research sample categorized as receiving free/reduced-cost lunch ($n = 377$) compared to the number of ELLs in the research sample not categorized as receiving free/reduced-cost lunch ($n = 26$). When large inequalities in sample size exist across groups, power significantly decreases (Frazier, Tix, & Barron, 2004). Free/reduced-cost lunch was included as a control variable despite this identified inequality in sample-size, though power to detect its true significance is limited. The number of participants enrollment in each type of ESL model included in this study is also included in Table 1. The n for each ESL

model group was well above 75, the least acceptable amount of participants necessary according to statistical power analysis procedures to have sufficient power (.80) to detect effects.

Table 1: *Descriptive Information for ELLs Included in Research Sample*

	ESL model		Free/Reduced Lunch status	
	English-only	Bilingual	No	Yes
n	127	276	26	377

Table 2 lists the means and standard deviations for the continuous variables prior to centering procedures. Examining the means and standard deviations for these variables allowed for the comparison of reading and language skills for an overall Kindergarten group of ELLs, for Kindergarten ELLs enrolled in an English-only ESL model, and for Kindergarten ELLs enrolled in a bilingual ESL model. The variables Initial English Proficiency (InitialENG) and Initial Spanish Proficiency (InitialSPA) were measured at the beginning of the Kindergarten year. The variables beginning-of-year Florida Assessments for Instruction in Reading (FAIR 1), middle-of-year FAIR (FAIR 2), and end-of-year FAIR (FAIR 3) represented a repeated measure of English reading skills conducted throughout the Kindergarten year. The variable that represented learning growth on FAIR for each student was calculated by subtracting a student's score on FAIR 1 from their score on FAIR 3 (FAIRGrowth). The variables Comprehensive English Language Learning Assessment (CELLA) Listening/Speaking (CELLAListSpk) and CELLA Reading (CELLAReading) were outcome measures of English oral language and reading skills conducted at the end of the Kindergarten year.

Table 2: *Mean +/- SD for Kindergarten Assessments*

	Overall[a]		English-only ESL model		Bilingual ESL model	
	Mean	SD	Mean	SD	Mean	SD
InitialENG	46	31	63	23	38	31
InitialSPA	64	24	58	24	67	24
FAIR 1	48	29	58	26	44	30
FAIR 2	65	29	72	25	61	30
FAIR 3	78	22	82	19	77	23
FAIRGrowth	30	28	23	26	33	29
CELLAListSpk	628	40	651	27	617	41
CELLAReading	527	91	566	73	509	92

[a]Includes students enrolled in both English-only and bilingual ESL models.

The variables InitialENG and InitialSPA were explored further to determine whether significant differences in initial language proficiency exist among the different ESL model and free-reduced-cost lunch groups. Independent samples t-tests were conducted to compare initial language proficiency means in 1) English-only versus bilingual ESL model conditions, and 2) Free/reduced-cost lunch versus non-Free/Reduced-cost lunch conditions. These comparisons provided a broad understanding of differences among the groups sampled.

Table 3: *Initial Language Proficiency Means for English-Only and Bilingual ESL Model Groups*

	ESL model			
	English-Only	Bilingual	*t*	*df*
InitialENG	62.74 (22.940)	37.66 (30.651)	8.219**	401
InitialSPA	57.52 (24.289)	66.96 (23.912)	3.665**	401

Note. Standard Deviations appear in parentheses below means.
*p < .05. **p < .01.

As shown in Table 3, there was a significant difference in initalENG scores ($t(401) =$ 8.219, $p < .01$) between English-only ($M = 62.74$, $SD = 22.940$) and bilingual ESL model ($M =$ 37.66, $SD = 30.651$) groups. A significant difference in initialSPA scores ($t(401) = 3.665$, $p <$ .01) was also found between English-only ($M = 57.52$, $SD = 24.289$) and bilingual ESL model ($M = 66.96$, $SD = 23.912$) groups.

Table 4: *Initial Language Proficiency Means for Free/Reduced and non-Free/Reduced-Cost Lunch Groups*

| | F/RLunch | | | |
	Yes	No	*t*	*df*
InitialENG	44.31 (39.603)	63.81 (26.818)	3.166**	401
InitialSPA	63.98 (24.553)	64.08 (22.509)	.019	401

Note. Standard Deviations appear in parentheses below means.
*$p < .05$. **$p < .01$.

As shown in Table 4, there was a significant difference in initial English proficiency scores ($t(401) = 3.166$, $p < .01$) between the free/reduced-cost lunch group ($M = 44.31$, $SD =$ 39/603) and the non-free/reduced-cost lunch group ($M = 63.81$, $SD = 26.818$). No significant difference in initial Spanish proficiency scores ($t(401) = .019$, $p > .05$) were found between the free/reduced-cost lunch ($M = 63.98$, $SD = 24.553$) and the non-free/reduced-cost lunch group ($M = 64.08$, $SD = 22.509$).

Hierarchical Linear Regression Analysis

Hierarchical linear regressions were performed on the dependent variables FAIRGrowth, CELLAListSpk, and CELLAReading. A separate analysis was conducted for each of the language proficiency variables, InitialENG and InitialSPA. F/RLunch was included as a control variable to represent socio-economic status in each regression. The subsequent regression analyses were conducted using centered scores for the continuous independent variables to reduce possible multicollinearity. Centering reduces high correlations between the moderators and interaction product terms (Frazier, Tix, & Barron, 2004). The centered variables InitialENG and InitialSPA had a mean of 0 and a standard deviation of 1.

In each of the six main regression analyses, the categorical control variable F/RLunch was included as a first step. The categorical predictor variable ESL Model (ESLModel) was included as a second step. An initial language proficiency variable was included at the third step. At the fourth step, the interaction product term was added to measure the moderation effect. The interaction product terms were defined as ESLModel x InitialENG (ESLEINT) and ESLModel x InitialSPA (ESLSINT). To attempt to answer each hypothesis comprehensively, the regression models at each step of the hierarchical analysis were individually analyzed. The best regression model was defined as the regression model explaining the highest level of variance in the dependent variable at an acceptable level of significance. After the best regression model was identified, the unstandardized b weights rather than standardized Beta weights were utilized to interpret results. In equations that include interaction product terms, the Beta weights are not interpretable because they are not properly standardized (Frazier, Tix, & Barron, 2004).

In the event of rejection of a null hypothesis for any of the six main regression analyses, the moderation effect was further examined in a second regression analysis. As shown in Table 1 and 4, the number of students categorized as non-F/RLunch was relatively small ($n = 26$) compared to the number of students categorized as F/RLunch ($n = 377$) and significant differences in language proficiency existed among the two groups. Due these large differences between the majority of students categorized as receiving free/reduced-cost lunch and those students categorized as non-free/reduced lunch, the non-free/reduced lunch group was excluded from the second regression analysis. This allowed the researcher to further measure the impact of socioeconomic status on ELLs' academic achievement.

H1. Initial English Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and FAIR Growth

An analysis of the regression model at each step of the regression procedure is shown in Table 5. At Step 1, F/RLunch alone explained 2.1% of the variance in FAIRGrowth (R^2 Change $= .021$, $p < .01$). At Step 2, ESLModel explained an additional 1.9% of the variance in FAIRGrowth (R^2 Change $= .019$, $p < .01$). Added at Step 3, InitialENG explained an additional 8.2% of the variance in the model (R^2 Change $= .082$, $p < .01$). The interaction product term entered into the regression procedure at Step 4 predicted an additional 0% of variance in the overall regression model and this change was not considered statistically significant (R^2 Change $= .000$, $p > .05$). The Step 3 regression model, which did not include the interaction term, appeared to be the best predictor of FAIRGrowth.

Table 5: *Moderating Effects of Initial English Proficiency on the Relationship Between ESL Model and FAIR Growth*

Step and variable	B	$SE\ B$	95% CI	β	R^2	R^2 Change
Step 1						
F/RLunch	16.667	5.635	5.589, 27.745	.146*	.021	.021**
Step 2						
F/RLunch	13.626	5.693	2.434, 24.819	.119*		
ESLModel	8.398	3.011	2.479, 14.317	.139**	.040	.019**
Step 3						
F/RLunch	10.554	5.475	-.208, 21.317	.093		
ESLModel	1.587	3.091	-4.490, 7.663	.026		
InitialENG	-.284	.047	-.375, -.193	-.311**	.122	.082**
Step 4						
F/RLunch	10.364	5.512	-.472, 21.201	.091		
ESLModel	1.150	3.375	-5.485, 7.784	.019		
InitialENG	-.314	.104	-.518, -.110	-.344**		
ESLModel x InitialENG	.038	.116	-.190, .265	.034	.122	.000

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0.
F/RLunch was represented as two dummy variables with No serving as the reference group 0.
*$p < .05$. **$p < .01$.

Overall, the linear composite of the control and independent variables entered into the regression procedure at Step 3 predicted (or explained) 12.2% of the variation in the dependent criterion FAIRGrowth (F (3, 399) = 18.494, $p < .01$). As shown in Table 5, the confidence intervals around the b weight for the independent variable InitialENG did not include zero as a probable value at Step 2. This suggested that the results for InitialENG were statistically significant and precise enough to be retained in the specified model. The confidence interval around the b weights obtained for the control variable F/RLunch and the independent variable ESLModel did include zero as a probable value among other probable values. This suggested that the results for the variables F/RLunch and ESLModel should not be retained in the specified model.

Closer inspection of the b weights for the main effects model at Step 3 suggested that with every unit increase of the centered variable InitialENG, a .284 unit decrease was observable in the dependent criterion FAIRGrowth when all other variables were held constant. The b weights for the variables F/RLunch and ESLModel at Step 3 were not examined because the results were not statistically significant. Inspection of the variance inflation factor (VIF) for each of the predictors suggested that multicollinearity was not problematic. This VIF for the predictors did not exceed 10. Since the interaction term did not significantly contribute to the final model after controlling for the main effects, the null hypothesis was not rejected for H1.

H2. Initial Spanish Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and FAIR Growth

An analysis of the regression model at each step of the regression procedure is shown in Table 6. At Step 1, F/RLunch alone explained 2.1% of the variance in FAIRGrowth (R^2 Change $= .021, p < .01$). At Step 2, ESLModel explained an additional 1.9% of the variance in FAIRGrowth (R^2 Change $= .019, p < .01$). Added at Step 3, InitialSPA explained an additional 0% of the variance in the model (R^2 Change $= .000, p > .05$). The interaction product term entered into the regression procedure at Step 4 predicted an additional 2.7% of variance in the overall regression model (R^2 Change $= .027, p < .01$). The Step 4 regression model appeared to be the best predictor of FAIRGrowth.

Table 6: *Moderating Effect of Initial Spanish Proficiency on the Relationship Between ESL Model and FAIR Growth*

Step and variable	B	SE B	95% CI	β	R^2	R^2 Change
Step 1						
F/RLunch	16.667	5.635	5.589, 27.745	.146*	.021	.021**
Step 2						
F/RLunch	13.626	5.693	2.434, 24.819	.119*		
ESLModel	8.398	3.011	2.479, 14.317	.139**	.040	.019**
Step 3						
F/RLunch	13.664	5.704	2.45, 24.878	.120*		
ESLModel	8.297	3.067	2.269, 14.326	.138**		
InitialSPA	.010	.057	-.103, .123	.009	.040	.000
Step 4						
F/RLunch	13.315	5.630	2.246, 24.384	.117*		
ESLModel	9.755	3.056	3.747, 15.764	.162**		
InitialSPA	-.271	.100	-.467, -.074	-.235**		
ESLModel x InitialSPA	.414	.121	.175, .652	.292**	.067	.027**

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0. F/RLunch was represented as two dummy variables with No serving as the reference group 0.
*$p < .05$. **$p < .01$.

Overall, the linear composite of all of the variables entered into the regression procedure at Step 4 predicted (or explained) 6.7% of the variation in the dependent criterion FAIRGrowth ($F (4, 398) = 7.189, p < .01$). As shown in Table 6, none of the confidence intervals around each of the b weights included zero as a probable value, so a value of zero was not probable among possible values. More conventionally, the b weights for the variables F/RLunch, ESLModel, InitialSPA, and ESLSINT may be described as statistically significant ($p < .01$). This suggested that the results for those variables were precise enough to be retained in the specified model.

Closer inspection of the b weights for the main effects model at Step 4 suggested that with every unit increase in ESLModel, a 9.755 unit increase was observable in the dependent criterion FAIRGrowth when all other variables were held constant. The overall relationship between InitialSPA and FAIRGrowth appeared negative, with a .271 unit decrease in

FAIRGrowth for every 1 unit increase in the centered variable InitialSPA. Since the interaction

of ESLModel and InitialSPA contributed significantly to the model, however, closer inspection

of the b weights for the interaction product term was most useful to analyze moderation effects.

Figure 2 depicts the FAIRGrowth-InitialSPA regression line for the students enrolled in a

bilingual ESL model compared to students enrolled in an English-only ESL model. According

to the b weights for the interaction product term shown in Table 6, the slope of the FAIRGrowth-

InitialSPA regression line significantly increased by .414 with each 1 unit increase in ESLModel.

Inspection of the VIF for each of the predictors suggested that multicollinearity was not

problematic. This VIF for the predictors did not exceed 10. Since the interaction term

significantly contributed to the model after controlling for the main effects, the null hypothesis

was rejected for H2.
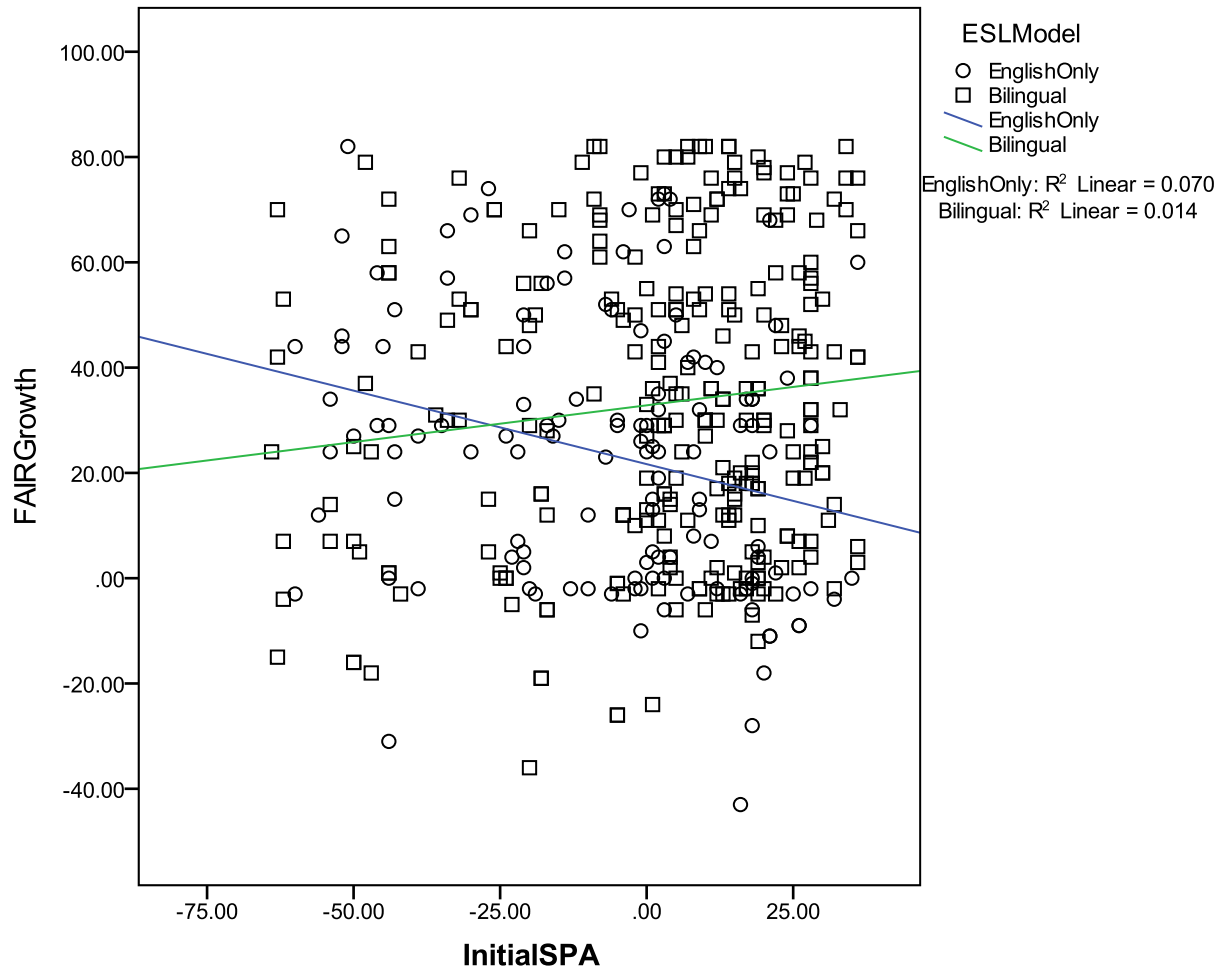
Figure 2. *Plot of Significant ESLModel x InitialSPA Interaction for FAIRGrowth*

Additional analysis of F/RLunch impact. The researcher removed the non-F/RLunch group to examine whether the H2 moderation effect would change with the exclusion of this smaller group of students exhibiting different language proficiency characteristics. Since the H2 secondary regression procedure was completed solely using cases categorized as "Yes" for the F/RLunch variable, F/RLunch was removed as a Step 1 control variable. In this secondary analysis, ESLModel was included at Step 1, InitialSPA at Step 2, and the interaction product term, ESLSINT, at Step 3.

An analysis of the regression model which excluded the non-F/RLunch group is shown in

Table 7. At Step 1, ESLModel alone explained 1.8% of the variance in FAIRGrowth (R^2 Change

= .018, $p < .01$). At Step 2, InitialSPA did not significantly explain any additional detectable

variance in FAIRGrowth (R^2 Change = .000, $p > .05$). Added at Step 3, the interaction product

term ESLSINT explained an additional 2.6% of the variance in the model when entered into the

equation (R^2 Change = .026, $p < .01$). The Step 3 regression model, which included the

interaction product term, still appeared to be the best predictor of FAIRGrowth.

Table 7: *Moderating Effect of Initial Spanish Proficiency on the Relationship Between ESL Model and FAIR Growth Excluding the Non-F/RLunch Group*

Step and variable	*B*	*SE B*	95% CI	*β*	R^2	R^2 Change
Step 1						
ESLModel	8.277	3.174	5.103, 11.451	.133**	.018	.018**
Step 2						
ESLModel	8.154	3.231	4.923, 11.385	.131*		
InitialSPA	.013	.060	-.047, .073	.011	.018	.000
Step 3						
ESLModel	9.826	3.236	6.59, 13.062	.158**		
InitialSPA	-.280	.109	.171, -.171	-.243*		
ESLModel x InitialSPA	.414	.130	.284, .544	.298**	.044	.026**

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0.
"No" cases of the variable F/RLunch were excluded from this analysis.
*$p < .05$. **$p < .01$.

Overall, the linear composite of all of the variables entered into the regression procedure

at Step 3 predicted (or explained) 4.4% of the variation in the dependent criterion FAIRGrowth

($F (3, 373) = 5.706$, $p < .01$). As shown in Table 7, the confidence intervals around the b

weights for the variables ESLModel and ESLSINT did not include zero as a probable value, so a

value of zero was not probable among possible values. More conventionally, the b weights for

the variables ESLModel and ESLSINT may be described as statistically significant ($p < .01$).

This suggested that the results for those variables were precise enough to be retained in the

specified model. The confidence interval around the b weight obtained for the variable

InitialSPA did include zero as a probable value among other probable values. This suggested

that the results for the variable InitialSPA should not be retained in the specified model. The

interaction product term representing the moderation effect contributed significantly to the model

even after excluding the non-F/RLunch group.

H3. Initial English Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Listening/Speaking Score

An analysis of the regression model at each step of the regression procedure is shown in

Table 8. At Step 1, F/RLunch alone explained 2.4% of the variance in CELLAListSpk (R^2

Change = .024, $p < .01$). At Step 2, ESLModel explained an additional 13.9% of the variance in

CELLAListSpk (R^2 Change = .139, $p < .01$). Added at Step 3, InitialENG explained an

additional 28.1% of the variance in the model (R^2 Change = .281, $p < .01$). The interaction

product term entered into the regression procedure at Step 4 significantly predicted an additional

0.6% of variance in the overall regression model (R^2 Change = .006, $p < .05$). The Step 4

regression model appeared to be the best predictor of CELLAListSpk.

Table 8: *Moderating Effect of Initial English Proficiency on the Relationship Between ESL Model and CELLA Listening/Speaking*

Step and variable	B	SE B	95% CI	β	R^2	R^2 Change
Step 1						
F/RLunch	-25.351	8.116	-41.307, -9.396	-.154**	.024	.024**
Step 2						
F/RLunch	-13.393	7.668	-28.467, 1.682	-.081		
ESLModel	-33.029	4.055	-41.307, -25.057	-.380**	.163	.139**
Step 3						
F/RLunch	-5.201	6.287	-17.561, 7.159	-.032		
ESLModel	-14.868	3.550	-21.846, -7.889	-.171**		
InitialENG	.757	.053	.652, .862	.575**	.443	.281**
Step 4						
F/RLunch	-6.542	6.299	-18.926, 5.842	-.040		
ESLModel	-17.950	3.857	-25.532, -10.368	-.206**		
InitialENG	.546	.118	.313, .778	.414**		
ESLModel x InitialENG	.265	.132	.005, .525	.168*	.449	.006*

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0. F/RLunch was represented as two dummy variables with No serving as the reference group 0.
*$p < .05$. **$p < .01$.

Overall, the linear composite of all of the variables entered into the regression procedure at Step 4 predicted (or explained) 44.9% of the variation in the dependent criterion CELLAListSpk (F (4, 398) = 80.997, $p < .01$). As shown in Table 8, the confidence intervals around the b weights for the variables ESLModel, InitialENG, and ESLEINT did not include zero as a probable value, so a value of zero was not probable among possible values. More conventionally, the b weights for the variables ESLModel, InitialENG, and ESLEINT may be described as statistically significant (p < .01). This suggested that the results for those variables were precise enough to be retained in the specified model. The confidence interval around the b weight obtained for the control variable F/RLunch did include zero as a probable value among other probable values. This suggested that the results for the independent variables F/RLunch should not be retained in the specified model.

Closer inspection of the b weights for the main effects model at Step 4 suggested that the overall relationship between InitialENG and CELLAListSpk appeared positive, with a .546 unit increase in CELLAListSpk for every 1 unit increase in the centered variable InitialENG. Since the moderation effect contributed significantly to the model, however, closer inspection of the b weights for the interaction product term was most useful. Figure 3 depicts the CELLAListSpk-InitialENG regression line for the students enrolled in a bilingual ESL model compared to students enrolled in an English-only ESL model. According to the b weights for the interaction product term shown in Table 8, the slope of the CELLAListSpk-InitialENG regression line increased significantly by .265 with each 1 unit increase in ESLModel. Inspection of the VIF for each of the predictors suggested that multicollinearity was not problematic. This VIF for the predictors did not exceed 10. Since the interaction term significantly contributed to the model after controlling for the main effects, the null hypothesis was rejected for H3.
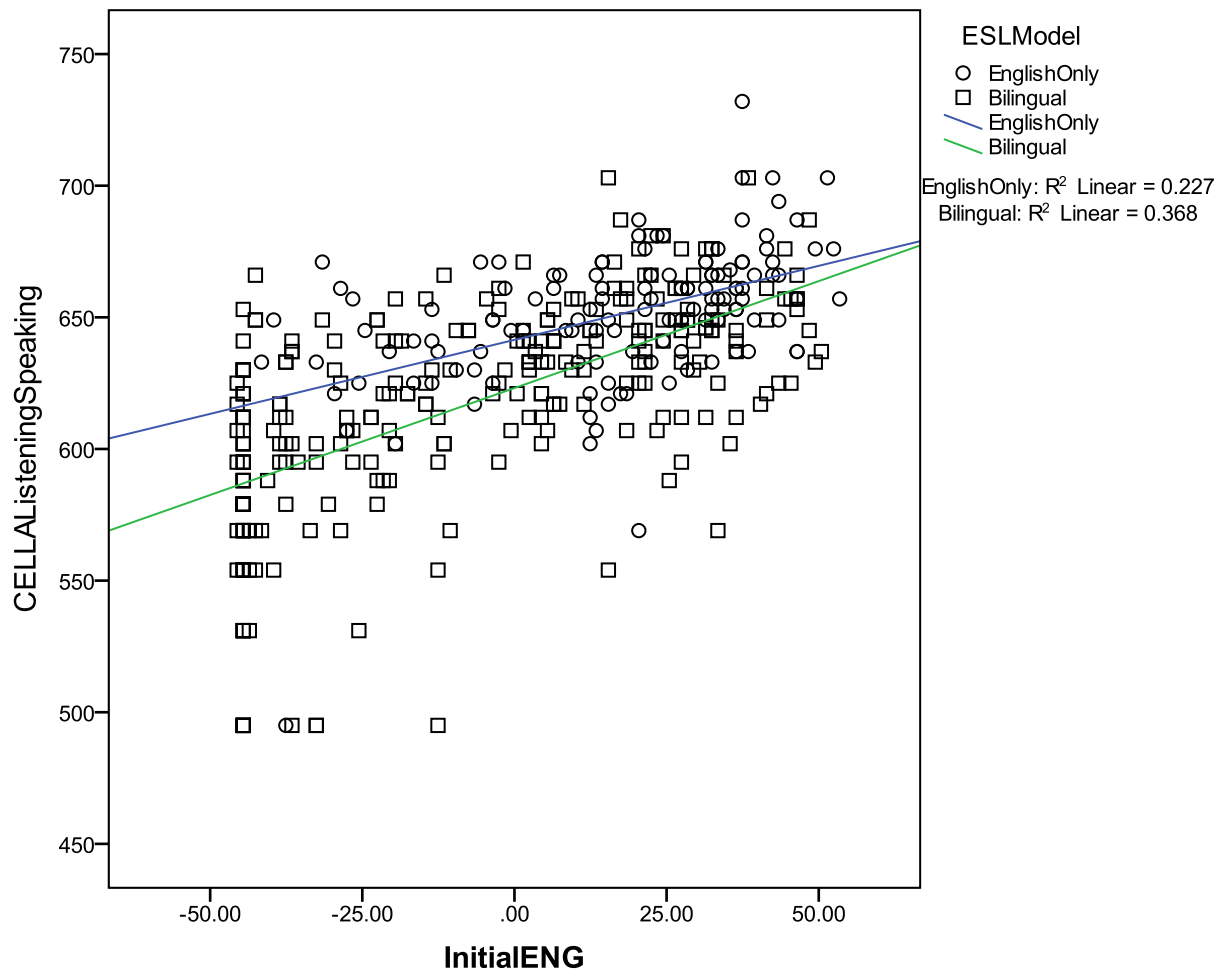
Figure 3. *Plot of Significant ESLModel x InitialENG Interaction for CELLAListSpk*

Additional analysis of F/RLunch impact. The researcher removed the non-F/RLunch group to examine whether the H3 moderation analysis would change with the exclusion of this smaller group of students exhibiting different language proficiency characteristics. Since the H3 secondary regression procedure was completed solely using cases categorized as "Yes" for the F/RLunch variable, F/RLunch was removed as a Step 1 control variable. ESLModel was included at Step 1, InitialSPA at Step 2, and the interaction product term, ESLSINT, at Step 3.

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An analysis of the regression model which excluded the non-F/RLunch group is shown in

Table 9. At Step 1, ESLModel alone explained 14.6% of the variance in CELLAListSpk (R^2

Change = .146, $p < .01$). At Step 2, InitialENG explained an additional 29.9% of variance in

CELLAListSpk (R^2 Change = .299, $p < .01$). Added at Step 3, the interaction product term

ESLEINT entered into the regression procedure explained an additional 0.4% of the variance in

the model, but this change was not statistically significant (R^2 Change = .004, $p > .05$). The Step

2 regression model for H3, which did not include the moderation effect, appeared to be the best

predictor of CELLAListSpk when the non-F/RLunch group was removed from the analysis.

Table 9: *Moderating Effect of Initial English Proficiency on the Relationship Between ESL Model and CELLAListSpk Excluding the Non-F/RLunch Group*

Step and variable	B	$SE\ B$	95% CI	β	R^2	R^2 Change
Step 1						
ESLModel	-34.158	4.268	-38.426, -29.89	-.382**	.146	.146**
Step 2						
ESLModel	-15.596	3.685	-19.281, -11.911	-.174**		
InitialENG	.778	.055	.723, .833	.585**	.445	.299**
Step 3						
ESLModel	-18.128	4.009	-22.137, -14.119	-.203**		
InitialENG	.595	.128	.467, .723	.447**		
ESLModel x InitialENG	.224	.142	.082, .366	.144	.449	.004

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0.
"No" cases of the variable F/RLunch were excluded from this analysis.
*$p < .05$. **$p < .01$.

H4. Initial Spanish Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Listening/Speaking Score

An analysis of the regression model at each step of the regression procedure is shown in

Table 10. At Step 1, F/RLunch alone explained 2.4% of the variance in CELLAListSpk (R^2

Change = .024, $p < .01$). At Step 2, ESLModel explained an additional 13.9% of the variance in

CELLAListSpk (R^2 Change = .139, $p < .01$). Added at Step 3, InitialSPA explained an

additional 2% of the variance in the model (R^2 Change = .020, $p < .01$). The interaction product

term entered into the regression procedure at Step 4 predicted an additional 0.2% of variance in

the overall regression model and this change was not considered statistically significant (R^2

Change = .002, $p > .05$). The Step 3 regression model, which did not include the interaction

term, appeared to be the best predictor of CELLAListSpk.

Table 10: *Moderating Effect of Initial Spanish Proficiency on the Relationship Between ESL Model and CELLA Listening/Speaking*

Step and variable	B	SE B	95% CI	β	R^2	R^2 Change
Step 1						
F/RLunch	-25.351	8.116	-41.307, -9.396	-.154**	.024	.024**
Step 2						
F/RLunch	-13.393	7.668	-28.467, 1.682	-.081		
ESLModel	-33.029	4.055	-41.307, -25.057	-.380**	.163	.139**
Step 3						
F/RLunch	-12.516	7.589	-27.436, 2.403	-.076		
ESLModel	-35.386	4.080	-43.407, -27.366	-.407**		
InitialSPA	.240	.076	.090, .390	.145*	.183	.020**
Step 4						
F/RLunch	-12.375	7.590	-27.296, 2.547	-.075		
ESLModel	-35.979	4.120	-44.078, -27.879	-.414**		
InitialSPA	.354	.135	.089, .619	.214**		
ESLModel x InitialSPA	-.168	.163	-.489, .153	-.082	.185	.002

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0.
F/RLunch was represented as two dummy variables with No serving as the reference group 0.
*$p < .05$. **$p < .01$.

Overall, the linear composite of the control and independent variables entered into the

regression procedure at Step 3 predicted (or explained) 18.3% of the variation in the dependent

criterion CELLAListSpk (F (3, 399) = 29.776, $p < .01$). As shown in Table 10, the confidence

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intervals around the b weights for the independent variables ESLModel and InitialSPA did not include zero as a probable value at Step 3. This suggested that the results for ESLModel and InitialSPA were statistically significant and precise enough to be retained in the specified model. The confidence interval around the b weight obtained for the control variable F/RLunch did include zero as a probable value among other probable values. This suggested that the results for the variable F/RLunch should not be retained in the specified model.

Closer inspection of the b weights for the main effects model at Step 3 suggested that with every unit increase of the variable ESLModel, a 35.386 decrease in CELLAListSpk was observable. With every unit increase in the centered variable InitialSPA, a .240 unit increase was observable in the dependent criterion CELLAListSpk when all other variables were held constant. The b weight for the variable F/RLunch at Step 3 was not examined because the results were not statistically significant. Inspection of the VIF for each of the predictors suggested that multicollinearity was not problematic. This VIF for the predictors did not exceed 10. Since the interaction term did not significantly contribute to the final model after controlling for the main effects, the null hypothesis was not rejected for H4.

H5. Initial English Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Reading Score

An analysis of the regression model at each step of the regression procedure is shown in Table 11. At Step 1, F/RLunch alone explained 1.5% of the variance in CELLAReading (R^2 Change = .015, $p < .05$). At Step 2, ESLModel explained an additional 7.6% of the variance in CELLAReading (R^2 Change = .076, $p < .01$). Added at Step 3, InitialENG explained an

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additional 11.3% of the variance in the model (R^2 Change = .113, $p < .01$). The interaction

product term entered into the regression procedure at Step 4 predicted an additional 0.1% of

variance in the overall regression model but this change was not considered statistically

significant (R^2 Change = .001, $p > .05$). The Step 3 regression model, which did not include the

interaction term, appeared to be the best predictor of CELLAReading.

Table 11: *Moderating Effect of Initial English Proficiency on the Relationship Between ESL Model and CELLA Reading*

Step and variable	B	SE B	95% CI	β	R^2	R^2 Change
Step 1						
F/RLunch	-45.190	18.252	-81.071, -9.308	-.123*	.015	.015*
Step 2						
F/RLunch	-25.398	17..887	-60.563, 9.767	-.069		
ESLModel	-54.663	9.459	-73.258, -36.067	-.281**	.091	.076**
Step 3						
F/RLunch	-13.749	16.829	-46.834, 19.335	-.037		
ESLModel	-28.837	9.502	-47.517, -10.157	-.148**		
InitialENG	1.077	.143	.796, 1.358	.365**	.204	.113**
Step 4						
F/RLunch	-15.221	16.932	-48.509, 18.066	-.041		
ESLModel	-32.220	10.366	-52.599, -11.840	-.165**		
InitialENG	.844	.318	.219, 1.470	.286**		
ESLModel x InitialENG	.291	.355	-.408, .989	.082	.205	.001

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0.
F/RLunch was represented as two dummy variables with No serving as the reference group 0.
*$p < .05$. **$p < .01$.

Overall, the linear composite of the control and independent variables entered into the

regression procedure at Step 3 predicted (or explained) 20.4% of the variation in the dependent

criterion CELLAReading ($F (3, 399) = 34.112$, $p < .01$). As shown in Table 11, the confidence

intervals around the b weights for the independent variables ESLModel and InitialENG did not

include zero as a probable value at Step 3. This suggested that the results for ESLModel and

InitialENG were statistically significant and precise enough to be retained in the specified model. The confidence interval around the b weight obtained for the variables F/RLunch did include zero as a probable value among other probable values. This suggested that the results for the variable F/RLunch should not be retained in the specified model.

Closer inspection of the b weights for the main effects model at Step 3 suggested that with every unit increase of the variable ESLModel, a 28.837 decrease in CELLAReading was observable. With every unit increase in the centered variable InitialENG, a 1.077 unit increase was observable in the dependent criterion CELLAReading when all other variables were held constant. The b weight for the variable F/RLunch at Step 3 was not examined because the results were not statistically significant. Inspection of the VIF for each of the predictors suggested that multicollinearity was not problematic. This VIF for the predictors did not exceed 10. Since the interaction term did not significantly contribute to the final model after controlling for the main effects, the null hypothesis was not rejected for H5.

H6. Initial Spanish Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Reading Score

An analysis of the regression model at each step of the regression procedure is shown in Table 12. At Step 1, F/RLunch alone explained 1.5% of the variance in CELLAReading (R^2 Change = .015, $p < .05$). At Step 2, ESLModel explained an additional 7.6% of the variance in CELLAReading (R^2 Change = .076, $p < .01$). Added at Step 3, InitialSPA explained an additional 0.7% of the variance in the model but this change was not considered statistically significant (R^2 Change = .007, $p > .05$). The interaction product term entered into the regression

procedure at Step 4 predicted an additional 0.4% of variance in the overall regression model but

this change was also not considered statistically significant (R^2 Change = .004, $p > .05$). The

Step 2 regression model, which did not include the interaction product term or InitialSPA,

appeared to be the best predictor of CELLAReading.

Table 12: *Moderating Effect of Initial Spanish Proficiency on the Relationship Between ESL Model and CELLA Reading*

Step and variable	B	$SE\ B$	95% CI	β	R^2	R^2 Change
Step 1						
F/RLunch	-45.190	18.252	-81.071, -9.308	-.123*	.015	.015*
Step 2						
F/RLunch	-25.398	17..887	-60.563, 9.767	-.069		
ESLModel	-54.663	9.459	-73.258, -36.067	-.281**	.091	.076**
Step 3						
F/RLunch	-24.263	17.855	-59.364, 10.838	-.066		
ESLModel	-57.716	9.599	-76.586, -38.845	-.296**		
InitialSPA	.311	.180	-.042, .664	.084	.098	.007
Step 4						
F/RLunch	-24.667	17.845	-59.750, 10.416	-.067		
ESLModel	-56.026	9.687	-75.070, -36.982	-.288**		
InitialSPA	-.015	.317	-.637, .608	-.004		
ESLModel x InitialSPA	.479	.384	-.276, 1.235	.105	.101	.004

Note. ESLModel was represented as two dummy variables with English-only serving as the reference group 0.
F/RLunch was represented as two dummy variables with No serving as the reference group 0.
*$p < .05$. **$p < .01$.

The independent variable ESLModel entered into the regression procedure predicted (or

explained) 9.1% of the variation in the dependent criterion CELLAReading when controlling for

free/reduced-cost lunch status ($F (2, 400) = 20.010$, $p < .01$). As shown in Table 12, the

confidence interval around the b weight for the independent variable ESLModel did not include

zero as a probable value, so a value of zero was not probable among possible values. More

conventionally, the b weight for the independent variable ESLModel may be described as

statistically significant ($p < .01$) and that variable is precise enough to be retained in the specified model. The confidence interval around the b weight obtained for the variables F/RLunch did include zero as a probable value among other probable values. This suggested that the results for the variable F/RLunch should not be retained in the specified model.

Closer inspection of the b weight suggested that with every unit increase in ESLModel, a 57.663 unit decrease was observable in the dependent criterion CELLAReading. The b weight for the control variable F/RLunch at Step 2 was not examined because the results were not statistically significant. Inspection of the VIF for each of the predictors suggested that multicollinearity was not problematic. This VIF for the predictors did not exceed 10. Since the interaction term did not significantly contribute to the model after controlling for the main effects, the null hypothesis was not rejected for H6.

CHAPTER 5: DISCUSSION

Introduction

Through the current study, the researcher attempts to investigate the conditions which alter the effectiveness of bilingual English as a Second Language (ESL) instructional models. Based on the conceptual framework for the study, the researcher assumes that type of ESL model impacts a student at the Tier I level of Response to Intervention (RtI). Another research assumption is that bilingual ESL models require more complex verbal processing from students than monolingual, English-only ESL models. It is important to analyze expectations for student performance at Tier I so that informed decisions about student academic progress can be made (Fuchs & Fuchs, 2006). Bilingual ESL models have been purported to lead to the most positive English language learner (ELL) outcomes (Flood, Lapp, Villamil Tinajero, & Rollins Hurley, 1997; Thomas & Collier, 1997). Based on Cognitive Load Theory (CLT), however, the researcher proposes that ELLs with language deficits may experience significant cognitive load when receiving instruction through a bilingual modality due to the complexity of the verbal stimuli inherent in bilingual learning environments. Previous research has established that students with language deficits experience negative cognitive load when required to process complex verbal information (Belke, 2008; Montgomery & Evans, 2009).

It is possible that a bilingual ESL model is related to positive student outcomes for some ELLs more than for others. The researcher investigated the relevancy of initial language proficiency and its impact on student academic outcomes for English-only and bilingual ESL models within a large public school district in Central Florida. Student academic achievement

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was measured using student Florida Assessments for Instruction in Reading (FAIR),

Comprehensive English Language Learning Assessment (CELLA) Listening/Speaking, and

CELLA Reading scores. Hierarchical linear regression with moderators was utilized to analyze

the moderation effect of language proficiency on the relationship between ESL model and

Kindergarten academic achievement. Free/reduced-cost lunch status represented the effects of

socio-economic status. This research focused on investigating the following research

hypotheses:

> H1. Initial English language proficiency will be a significant moderating variable
>
> impacting the relationship between ESL Model and FAIR Growth
>
> H2. Initial Spanish language proficiency will be a significant moderating variable
>
> impacting the relationship between ESL Model and FAIR Growth
>
> H3. Initial English language proficiency will be a significant moderating variable
>
> impacting the relationship between ESL Model and CELLA Listening/Speaking
>
> score
>
> H4. Initial Spanish language proficiency will be a significant moderating variable
>
> impacting the relationship between ESL Model and CELLA Listening/Speaking
>
> score
>
> H5. Initial English language proficiency will be a significant moderating variable
>
> impacting the relationship between ESL Model and CELLA Reading score
>
> H6. Initial Spanish language proficiency will be a significant moderating variable
>
> impacting the relationship between ESL Model and CELLA Reading score

Participants and Data Collection

The data included in the current study was collected from a large public school district in Central Florida. The researcher implemented a cross-sectional analysis design due to the infeasibility of using large-scale experimental design within a public school district setting. Purposive sampling was utilized to ensure a particular group of students was included in the study. The number of participants after initial data screenings was 403 ($n = 403$). According to statistical power analysis, the group sizes for the bilingual ESL model group ($n = 276$) and for the English-only ESL model group ($n = 127$) were well above the minimum recommended number of participants per group to ensure accurate detection of significant results ($n = 75$, Power = .80).

District staff collected historical data for students enrolled in Kindergarten Sheltered English (English-only) and One-Way Developmental (bilingual) ESL models district-wide during the 2010-2011 school year. All data was made anonymous prior to being submitted to the researcher. The dependent variables were measured using student FAIR (FAIRGrowth), CELLA Listening/Speaking (CELLAListSpk), and CELLA Reading (CELLAReading) scores. Free-reduced-cost lunch status (F/RLunch) was included as a control variable to account for the impact of socioeconomic status on student academic performance.

This study focused on language processing deficits as a possible moderator of the effectiveness of bilingual ESL models. Cognitive functioning, as measured by comprehensive measures of cognitive functioning, is comprised of many broad and narrow processing abilities (McGrew & Wendling, 2010). Crystallized intelligence refers to language development, lexical knowledge, and listening ability (McGrew & Wendling, 2010). As an area of intelligence, it can

be an indicator of relative language weaknesses or an indicator of possible overall cognitive deficits. Crystallized intelligence was regarded in this study as the most specific and relevant cognitive processing area to specifically address the research question. The variables initial English (InitialENG) and initial Spanish (InitialSPA) language proficiency were measured using the English and Spanish forms of the Pre-Language Assessment Scale 2 (preLAS-2).

Conclusions

Demographic and descriptive information was presented in Tables 1 and 2. A large majority of ELLs in the research sample were categorized as receiving free/ reduced-cost lunch ($n = 377$). Large inequalities in sample size significantly decrease power of analysis (Frazier, Tix, & Barron, 2004). Thus, caution must be utilized when interpreting the impact of socio-economic status in this study. The true effects of the control variable may not be comprehensively represented in this study due to the inequalities in sample size between the two groups of the variable free/reduced-cost lunch.

Analyses of differences in initial language proficiency among various groups were presented in Tables 2, 3 and 4. Interpretation of non-centered initial language proficiency scores can best be accomplished through the application of Pre-LAS-2 guidelines. As defined by pre-LAS-2 test norms, a student must score at 82 or above to be considered a Fluent Speaker in English or Spanish (Duncan & DeAvila, 2000). A Limited Speaker group is defined as participants obtaining a preLAS-2 raw score of 62-81 (Duncan & DeAvila, 2000). A Non-Speaker is defined as a student obtaining a preLAS-2 score of 61 or less (Duncan & DeAvila, 2000).

As shown in Table 2, ELLs begin Kindergarten, on average, with a Non-Speaker level of English proficiency ($m = 46$, SD = 31) and a Limited-Speaker level ($m = 64$, SD = 24) of Spanish proficiency. As shown in Table 3, students in English-only ESL models enroll in Kindergarten with significantly ($p < .01$) higher initial English proficiency ($M = 63$, $SD = 23$) than students in bilingual ESL models ($M = 38$, $SD = 31$). In contrast, significantly higher ($p < .01$) initial Spanish proficiency scores were observed for students enrolled in bilingual ESL models ($M = 67$, $SD = 24$) than students enrolled in English-only ESL models ($M = 58$, $SD = 24$).

Significant differences in initial language proficiency were also observed between students categorized as receiving free/reduced-cost lunch and those not receiving free/reduced-cost lunch (Table 4). Students receiving free/reduced-cost lunch enroll in Kindergarten with significantly lower mean initial English ($M = 44.31$, $SD = 30.603$) and than those students not receiving free/reduced-cost lunch ($M = 63.81$, $SD = 26.818$). Initial Spanish proficiency is not significantly higher for students not receiving free/reduced-cost lunch ($M = 64.08$, $SD = 22.509$) than for students receiving free/reduced-cost lunch ($M = 63.98$, $SD = 24.553$). Upon rejection of a null hypothesis in this study, the researcher removed the group of students categorized as non-free/reduced-cost lunch from a second regression analysis to further analyze the impact of socioeconomic status on language proficiency and ELL academic achievement. In the following sections, the results of each of the six main hierarchical linear regression analysis conducted and each of the two secondary regression analyses conducted are discussed.

H1. Initial English Language Proficiency will be a Significant Moderating Variable

Impacting the Relationship Between ESL Model and FAIR Growth

The moderating impact of varying levels of initial English proficiency on the relationship between ESL model and student learning growth on FAIR was examined to address H1. Findings presented in Table 5 indicated that the regression model significantly explaining the most variance in FAIRGrowth included the variables free/reduced-cost lunch status, ESL model, and initial English proficiency. This regression model accounted for 12.2% of the variation in FAIRGrowth ($R^2 = .122$, $p < .01$). Upon further analysis of the variables, the impact of free/reduced-cost lunch status and ESL model type were not found to be significant enough to be retained in the overall regression model when initial English proficiency was held constant. This suggested that initial English proficiency was the most powerful predictor of FAIRGrowth in this analysis.

In this study, most of the change in FAIRGrowth was attributable to the direct effect of initial English proficiency when free/reduced-cost lunch status and ESL model were held constant. A unit increase on the centered variable initial English proficiency was found to significantly decrease FAIR score growth by .284. Kindergarten students with lower initial levels of English language proficiency demonstrated higher learning gains on FAIR during Kindergarten, regardless of ESL model or socio-economic status. The null hypothesis was not rejected for Hypothesis 1 due to the lack of evidence supporting English language proficiency as a significant moderator of the relationship between ESL model and FAIRGrowth.

H2. Initial Spanish Language Proficiency will be a Significant Moderating Variable

Impacting the Relationship Between ESL Model and FAIR Growth

The impact of varying levels of initial Spanish proficiency on the relationship between ESL model and student learning growth on FAIR was examined to address H2. Findings presented in Table 6 indicated that initial Spanish proficiency significantly altered the relationship between type of ESL model and FAIR score growth when controlling for all other variables included in the analysis. The regression model significantly predicting the most variance in FAIRGrowth included the impact of the interaction between ESL model and initial Spanish proficiency. This identified regression model explained 6.7% of the variation in FAIRGrowth ($R^2 = .067$, $p < .01$).

In this analysis, ELLs enrolled in a bilingual ESL model demonstrated significantly higher FAIRGrowth than students enrolled in an English-only ESL model. The impact of a bilingual ESL model, however, was significantly altered by initial Spanish proficiency level, as illustrated in Figure 2. Specifically, the slope of the FAIRGrowth-InitialSPA regression line positively increased by .414 for students enrolled in a bilingual ESL model. Students with higher initial Spanish proficiency demonstrated higher FAIR growth when receiving instruction through a bilingual ESL model. Students with lower initial Spanish proficiency demonstrated higher FAIR growth when receiving instruction through an English-only, Sheltered English ESL model. The null hypothesis was rejected for Hypothesis 2 because a significant amount of the variance in scores could be attributed to the moderating impact of initial Spanish proficiency on the relationship between ESL model and FAIRGrowth.

The significant impact of the moderator in this analysis was also analyzed after removal of the non-free/reduced-cost lunch group from the H2 regression procedure. Since no significant differences were found in initial Spanish proficiency between the two free/reduced-cost lunch groups, the exclusion of the non-free/reduced-cost lunch group was not expected to significantly alter the moderation effect of initial Spanish proficiency. Upon removal of the non-free/reduced-cost lunch group, the moderation effect was still significantly detectable for H2.

H3. Initial English Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Listening/Speaking Score

The impact of varying levels of initial English proficiency on the relationship between ESL model and CELLA Listening/Speaking Kindergarten outcome scores was examined to address H3. Findings presented in Table 8 indicated that initial English proficiency significantly altered the relationship between type of ESL model and CELLA Listening/Speaking scores when controlling for all other variables included in the analysis. The regression model significantly predicting the most variance in CELLA Listening/Speaking included the impact of the interaction between ESL model and initial English proficiency. This identified regression model explained 44.9% of the variation in CELLA Listening/Speaking ($R^2 = .449$, $p < .01$).

In this analysis, ELLs enrolled in an English-only ESL model demonstrated significantly higher CELLA Listening/Speaking scores at the end of Kindergarten than students enrolled in a bilingual ESL model when all other variables were held constant. The impact of ESL model, however, was significantly altered by initial English proficiency level, as illustrated in Figure 3. Specifically, the slope of the CELLAListSpk-InitialENG regression line positively increased by

.265 for students enrolled in a bilingual model. Students with lower initial English proficiency obtained higher CELLA Listening/Speaking scores when enrolled in English-only ESL models, but this difference in CELLA Listening/Speaking scores decreased as initial English proficiency increased. The null hypothesis was rejected for Hypothesis 3 because a significant amount of the variance in scores could be attributed to the moderating impact of initial English proficiency on the relationship between ESL model and CELLA Listening/Speaking scores.

Though significant, the moderating effect of initial English proficiency on the relationship between ESL model and CELLA Listening/Speaking scores was relatively small (R^2 Change = .006, $p < .05$). The significant impact of the moderator in this analysis was no longer detectable when the non-free/reduced-cost lunch group was removed from the H3 regression procedure. The excluded group was characterized by significantly higher initial English proficiency levels than the free/reduced-cost lunch group. When the non-free/reduced-cost lunch group was removed, the moderation effect was reduced to non-significant levels. This provides further support for the inclusion of both groups of the variable free/reduced-cost lunch so that the research sample maintains a comprehensive distribution of initial language proficiency scores.

H4. Initial Spanish Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Listening/Speaking Score

The impact of varying levels of initial Spanish proficiency on the relationship between ESL model and student CELLA Listening/Speaking scores was examined to address H4. Findings presented in Table 10 indicated that the regression model significantly explaining the most variance in CELLA Listening/Speaking scores included the variables free/reduced-cost

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lunch status, ESL model type, and initial Spanish proficiency. This regression model accounted for 18.3% of the variation in CELLA Listening/Speaking (R^2 = .183, p < .01). Upon further analysis of the variables, the impact of free/reduced-cost lunch status was not found to be significant enough to be retained in the overall regression model when all other variables were held constant. The variables initial Spanish proficiency and ESL model were the two most powerful predictors of CELLA Listening/Speaking Kindergarten outcome scores in this analysis.

In this analysis, when controlling for all other variables, ELLs enrolled in an English-only ESL model demonstrated significantly higher CELLA Listening/Speaking scores at the end of Kindergarten than students enrolled in a bilingual ESL model. Additionally, significant change in CELLA Listening/Speaking scores could be attributed to the direct effect of initial Spanish proficiency when all other variables were held constant. Kindergarten students with higher initial levels of Spanish language proficiency demonstrated higher scores on CELLA Listening/Speaking. The null hypothesis was not rejected for Hypothesis 4 due to lack of evidence supporting initial Spanish proficiency as a significant moderator of the relationship between ESL model and CELLA Listening/Speaking.

H5. Initial English Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Reading Score

The impact of varying levels of initial English proficiency on the relationship between ESL model and CELLA Reading Kindergarten outcome scores was examined to address H5. Findings presented in Table 11 indicated that the regression model significantly explaining the most variance in CELLA Reading scores included the variables free/reduced-cost lunch status,

ESL model type, and initial English proficiency. This regression model accounted for 20.4% of the variation in CELLA Reading scores ($R^2 = .204, p < .01$). Upon further analysis of the variables, the impact of free/reduced-cost lunch status was not found to be significant enough to be retained in the overall regression model when initial English proficiency and ESL model was held constant. The variables initial English proficiency and ESL model were the two most powerful predictors of CELLA Reading Kindergarten outcome scores.

In this analysis, when controlling for all other variables, ELLs enrolled in an English-only ESL model demonstrated significantly higher CELLA Reading scores at the end of Kindergarten than students enrolled in a bilingual ESL model. Additionally, significant change in CELLA Reading scores could also be attributed to the direct effect of initial English proficiency when all other variables were held constant. Kindergarten students with higher initial levels of English language proficiency demonstrated higher scores on CELLA Reading. The null hypothesis was not rejected for Hypothesis 5 due to the lack of evidence supporting initial English proficiency as a significant moderator of the relationship between ESL Model and CELLA Reading.

H6. Initial Spanish Language Proficiency will be a Significant Moderating Variable Impacting the Relationship Between ESL Model and CELLA Reading Score

The impact of varying levels of initial Spanish proficiency on the relationship between ESL model and CELLA Reading Kindergarten outcome scores was examined to address the sixth and final hypothesis. Findings presented in Table 12 indicated that the regression model significantly explaining the most variance in CELLA Reading scores included the variables

free/reduced-cost lunch status and ESL model type. This regression model accounted for 9.1%

of the variation in CELLA Reading scores ($R^2 = .091$, $p < .01$). Upon further analysis of the

variables, the impact of free/reduced-cost lunch status was not found to be significant enough to

be retained in the overall regression model when ESL model was held constant. ELLs enrolled

in an English-only ESL model demonstrated significantly higher CELLA Reading scores at the

end of Kindergarten than students enrolled in a bilingual ESL model. The null hypothesis was

not rejected for Hypothesis 6 due to the lack of evidence supporting initial Spanish proficiency

as a significant moderator of the relationship between ESL model and CELLA Reading.

Discussion of Significant Findings

Through the current study, the researcher investigated the conditions which alter the

effectiveness of a bilingual ESL model. According to Teaching English for Speakers of Other

Languages (TESOL) research literature, bilingual ESL models lead to the most positive

academic outcomes for ELLs (Flood, Lapp, Villamil Tinajero, & Rollins Hurley, 1997; Thomas

& Collier, 1997). However, studies investigating the effectiveness of ESL models do not

demonstrate that all forms of bilingual education are superior to any form of English-only

instruction for all ELLs (Cummins, 1998). A lack of data disaggregation based on diversity

markers problematizes the generalization of results to a heterogeneous ELL population.

Based on findings, significant variability in second language proficiency skills exists

among students categorized as free/reduced lunch versus non-free/reduced lunch. This supports

previous research indicating that socioeconomic status significantly impacts language

proficiency (Hoff, 2003; Payne, 2005). This impact is most significant for students of

generational poverty (Payne, 2005). This study did not find socioeconomic status a significant variable impacting initial native language proficiency, though the group size differences among the two free/reduced-cost lunch groups significantly decreased power to detect effects. As indicated by the current results, a variable representing socioeconomic status must be included in any analysis of the impact of language proficiency on ESL model effectiveness. In this type of research, it is important to ensure a socioeconomically diverse sample of ELLs in order to comprehensively assess the spectrum of ELL language proficiency levels.

Current research results indicate that initial English and Spanish proficiency are important and relevant variables significantly altering the effectiveness of ESL models. Thus, initial language proficiency must be considered when making data-based educational decisions. Testing for moderating variables is a sign of a mature field of inquiry and is important in evaluating interventions (Frazier, Tix, & Barron, 2004). Research examining the effectiveness of one type of ESL model over another should include language proficiency as a moderator in order to make generalizations regarding model effectiveness. A synthesis of the significant findings of the current research study is provided below.

Significance of Initial Spanish Proficiency

It is evident that the direct effect of initial Spanish language proficiency accounts for a significant amount of change in CELLA Listening/Speaking scores when all other variables, including ESL model, are held constant. Initial Spanish proficiency is not only a relevant variable directly impacting an ELL's academic outcome, but also a moderator which significantly alters the relationship between ESL model and ELLs' academic growth on FAIR.

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In other words, ELLs with below average initial Spanish proficiency demonstrate greater FAIR growth when receiving instruction through an English-only, rather than bilingual, ESL model. Conversely, ELLs with above average initial Spanish proficiency demonstrate higher GAIR growth when receiving instruction through a bilingual, rather than English-only, ESL model.

Theoretical and practical implications. Current findings relating to the relationship between initial Spanish proficiency and student performance on English reading and oral language assessments provides additional theoretical support for the critical influence of native language Cognitive Academic Language Proficiency (CALP) on second language CALP. This link is well-established in previous TESOL research literature (Rhodes, Ochoa, & Ortiz, 2005). Findings emphasizing the relationship between native language proficiency and academic growth highlight the importance of considering this variable in any analysis of student expectations at Tier I of RtI. Average initial native language proficiency levels provided can serve as possible screening benchmarks for ELLs with language deficits.

Findings supporting the moderating impact of initial Spanish proficiency on the effectiveness of bilingual ESL models suggest the need for an extension of CLT to the TESOL field of inquiry. Previous research indicates that complex learning environments can negatively impact learning by increasing cognitive load on working memory (Kalyuga, 2007a ; Paas, Renk, & Sweller, 2003). Students with language-based deficits have been previously found to demonstrate cognitive weaknesses in verbal processing, working memory, and processing speed (Archibald & Gathercole, 2007; Coady & Evans, 2008; Danahy, Windsor, & Kohnert, 2007; Leonard et al., 2007). To date, there have been no studies that examine the cognitive load created by bilingual ESL models for students with language-based deficits. Historically,

bilingual ESL models have been purported to be the most effective models for ELL instruction (Flood, Lapp, Villamil Tinajero, & Rollins Hurley, 1997; Thomas & Collier, 1997). While CLT has been applied to the fields of Education, Educational Psychology, and Communicative Disorders (Belke, 2008; Montgomery & Evans, 2009), application of CLT is lacking in available TESOL literature.

Moderator variables help examine "for whom" a predictor has the most impact (Frazier, Tix, & Barron, 2004). One of the most important finding of the current study is that possible differential academic outcomes, based on initial Spanish proficiency level, exist for students enrolled in bilingual ESL models. Investigating the moderating impact of native language deficits on the effectiveness of bilingual ESL models allows researchers and practitioners to further understand for whom each model of Tier I ESL maximizes positive response to instruction/intervention. Initial native language proficiency should be a variable included in any analysis of ESL model effectiveness at a classroom, school or district level.

Significance of Initial English Proficiency

Based on the findings, it is evident that the direct impact of initial English proficiency accounts for a significant amount of change in student academic performance on FAIR and CELLA Reading when all other variables, including ESL model, are held constant. Initial English proficiency was found to be a better predictor of FAIR growth than ESL model. Initial English proficiency also significantly alters the relationship between ESL model and student academic achievement on CELLA Listening/Speaking. In other words, students respond differently to bilingual instruction depending on their level of initial English proficiency.

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Students enrolled in English-only ESL models obtain higher CELLA Listening/Speaking scores at the end of Kindergarten than students enrolled in bilingual models. This difference in academic performance based on ESL model, however, decreases significantly for students with above average initial English proficiency.

Theoretical and practical implications. Though the relationship between English language proficiency and English language academic achievement measures is expected and well documented (Rhodes, Ochoa, & Ortiz, 2005), the findings for Hypothesis 1 and 5 are of practical significance because overall language proficiency as a diversity marker is not often considered when examining student academic outcomes (Artiles et al., 2005). These findings support the use of language proficiency, including second language proficiency, as a diversity marker when analyzing student response to instruction/intervention. When an ELL's response to instruction/intervention is interpreted without consideration for second language proficiency level, a student is at-risk for being misidentified as a student with disabilities (Artiles et al., 2005). Implications include an expansion of knowledge of what should be expected Tier I RtI Kindergarten outcomes for ELLs with various second language proficiency levels. As expectations for an ELL's academic growth and development are defined at Tier I of RtI, initial second language proficiency is a factor that requires examination in order to appropriately analyze learning progress and intervention effectiveness.

Significance of ESL Model

The researcher found that the direct impact of ESL model is rarely the best single predictor of ELL academic achievement. The H6 regression analysis was the only procedure

yielding results suggesting that ESL model is the best predictor of ELL academic outcomes. When controlling for initial Spanish proficiency, ELLs receiving instruction through an English-only program demonstrate higher CELLA Reading scores at the end of Kindergarten than ELLs receiving bilingual instruction. Findings for Hypothesis 2, 3, 4 and 5, however, indicate that initial English and Spanish proficiency are also significant variables affecting student outcomes. Furthermore, the importance of initial language proficiency as a moderator was highlighted by the rejection of the Hypothesis 2 and 3 nulls. In other words, while ESL model is important and relevant, initial English and Spanish proficiency can significantly alter its impact on student achievement. The differences in CELLA Listening/Speaking student outcomes are minimized between the various ESL model types as student initial English proficiency increases. The researcher also found that an English-only ESL model leads to higher FAIR growth for students with below average initial Spanish proficiency, while a bilingual ESL model leads to higher FAIR growth for students with above average initial Spanish proficiency. The variable ESLModel did not provide additional significant information regarding FAIR growth beyond information already provided by initial English proficiency.

Theoretical and practical implications. Much of the TESOL research literature focuses on analyzing the effectiveness of ESL models without disaggregating data based on important diversity markers such as student language proficiency and socioeconomic status. The findings of previous research correlate bilingual ESL models to the most positive academic outcomes for ELLs (Flood, Lapp, Villamil Tinajero, & Rollins Hurley, 1997; Thomas & Collier, 1997). The theoretical importance of the current findings is that these findings contrast against previous assumptions within the TESOL field of inquiry that a bilingual ESL model is best for all ELLs.

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The practical implications of these findings are that initial language proficiency must be considered when interpreting effectiveness of ESL instruction at Tier I of an RtI service-delivery model. Both native and second language proficiency significantly impact student academic achievement. This impact is in addition to or beyond the impact of ESL model type. When educators make recommendations regarding instruction and intervention, it is imperative that expectations for learning and growth be based on various diversity markers, including language proficiency and socioeconomic status. Ignoring initial language proficiency when making recommendations for ELLs at Tier I RtI can lead to inappropriate expectations of instruction/intervention response rate. Recommendations for one type of ESL model over another should also be based on multiple student factors rather than on the assumption that one model is always best.

Based on the findings of this study, the researcher provides important caveats to researchers and educators when generalizing results of ESL model effectiveness. According to the current findings, ESL model alone does not consistently provide comprehensive information regarding ELLs' academic achievement. A bilingual ESL model leads to higher growth on FAIR by the end of Kindergarten for students with above average initial Spanish proficiency but not for students with below average initial Spanish proficiency. English-only ESL models lead to higher English academic outcomes at the end of Kindergarten, based on CELLA Listening/Speaking and CELLA Reading scores. Initial native and second language proficiency also significantly impact an ELL's early academic achievement in the areas of oral language and reading. This opens a new path of investigation which includes initial language proficiency as a moderator in future TESOL studies.

Limitations of the Data

It is important to acknowledge certain limitations of the current study. While this study provides relevant information for educational practice and research, it is not complete in its analysis of the impact of language proficiency on the effectiveness of each type of ESL model. Though the research design attempts to answer the research question using best practices, future studies can improve upon the current methods. A non-experimental design was employed due to the infeasibility of conducting more intrusive large-scale experimental studies within a public school system. This decreased the diversity in both the participant sample and in the variables included. Thus, limitations in this study relate to the overall sampling method, to the nature of the dependent variables and to the diversity within the control variable.

The most comprehensive past analyses of the impact of ESL model on academic achievement incorporate longitudinal research designs (Thomas & Collier, 1997). A longitudinal design was not used in the current study. While the researcher attempted to address growth over time by including the FAIRGrowth variable, only Kindergarten academic achievement was measured. Thomas and Collier (1997) found that the impact of ESL model is minimal in Kindergarten. The impact of ESL model increases significantly by the time a student reaches 12th grade (Thomas & Collier, 1997). The cross-sectional design of this study may not have allowed the researcher to comprehensively explore the impact of ESL model on student achievement.

Another limitation in the current study is related to the nature of the dependent variables. The researcher measured English-only academic achievement through the use of FAIRGrowth, CELLAListSpk, and CELLAReading data. Study findings indicate that students enrolled in an

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English-only ESL model obtain higher CELLA Listening/Speaking and CELLA Reading scores by the end of Kindergarten than students enrolled in a bilingual ESL model. This may be a reflection of language of instruction rather than actual differences in student learning. Due to the unavailability of routinely administered parallel measures of English and Spanish academic achievement, a variable measuring Spanish academic achievement was not included in the analysis. The absence of Spanish measures of academic achievement may mask the positive impact of bilingual ESL models. Students being instructed in bilingual ESL models may demonstrate better academic outcomes in their native language.

Lastly, low power to detect the impact of the control variable, socioeconomic status, might be another limitation of the current study. Although the design included Free/Reduced-Cost Lunch Status as a measure of socioeconomic status, a large sample size difference among the two levels of this variable significantly reduced power to detect its impact. Large inequalities in sample size significantly decrease power of analysis (Frazier, Tix, & Barron, 2004). This was an unexpected limitation identified after finalizing data-collection. In this study, this limitation was a product of the demographics of the ELL population in the participating school district and not due to sampling method. It is possible that socio-economic status has a larger impact than could be detected in this study's analysis.

Recommendations for Future Studies

Through the current study, the researcher found that the impact of ESL model on academic achievement is moderated by language proficiency under certain conditions. Initial native and second language proficiency, in addition to ESL model choice, has a significant

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impact on ELLs' academic achievement. Future studies should continue to investigate the conditions which alter the impact of ESL model on student outcomes. Recommendation for future studies in regards to overall research design and variables to be considered are noted in this section.

Although the employed research analysis design proved useful in attempting to answer the research question, a longitudinal data collection method is recommended for future studies rather than the cross-sectional method utilized in the study. The cross-sectional method provides information about a population within a single point in time, while a longitudinal study provides information as to the rate of growth of academic achievement over a more significant period of time. In contrast to the longitudinal meta-analysis conducted by Thomas and Collier (1997), however, hierarchical regression with moderators should be used in future studies to analyze how various diversity markers alter the impact of ESL model on student academic outcomes. This recommendation is based on study findings that initial language proficiency significantly alters the relationship between ESL model and certain academic achievement measures. Considering how moderating variables impact the relationship between an independent and dependent variable increases the maturity and sophistication within an academic field of inquiry (Frazier, Tix, & Barron, 2004).

Additionally, future research should attempt to improve upon the current study by expanding upon the variables in this study. One expansion could be the sampling of students of more diverse socio-economic levels. Stratified random sampling could ensure equal group sizes within the variable Free/Reduced-Cost Lunch Status. Equal group sizes would increase the power to detect the effects of this variable. Also, a dependent variable measuring native

language academic achievement should be included in future studies in order to comprehensively address academic outcomes of ELLs receiving native language instruction through a bilingual ESL model. Inclusion of more comprehensive dependent variables and increased power to detect the impact of socioeconomic status would further explore the research question. The results of improvements upon the current study can lead to increased understanding of effective research-based Tier I ESL instruction and interventions for ELLs with varying levels of native and second language proficiency.

Findings support the significant impact of ESL model type, initial native language proficiency, and second language proficiency on ELLs' academic achievement. Educators can utilize the average English language and English early literacy Kindergarten outcomes defined in this study to determine whether an ELL's progress during Kindergarten is at, below, or above expectancy compared to his or her peers. The most important and relevant findings of the current research study support the moderating effect of initial native and second language proficiency on the effectiveness of ESL model. These findings can influence both current practice and future research because they provide a broader understanding of the most significant influences on ELLs' academic achievement. Future research should include these diversity markers when analyzing the effectiveness of ESL models. The positive relationship between bilingual ESL models and FAIR growth for students with above average initial Spanish proficiency appears to reverse for students with below average initial Spanish proficiency. It is critical that educators use the results of this study to inform their practice because these findings contrast against existing beliefs supporting the effectiveness of bilingual ESL models for all ELLs. When employing a Multi-Tier System of Supports (MTSS), or RtI, educators engaged at

a Tier I decision-making process must consider the important and relevant impact of initial language proficiency when making ESL instructional recommendations, defining learning expectations, and analyzing academic outcomes for ELLs.

APPENDIX A: UCF INSTITUTION REVIEW BOARD NOT HUMAN RESEARCH

DETERMINATION LETTER

University of
Central
Florida

NOT HUMAN RESEARCH DETERMINATION

From : **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To : **Maria-Jose Soong**

Date : **February 16, 2011**

Dear Researcher:

On 2/16/2011 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review:	Addendum Modification Request Form
Project Title:	Tier I RtI for English Language Learners with Language Deficits
Investigator:	Maria-Jose Soong
IRB ID:	SBE-10-07223
Funding Agency:	None

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of the IRB Chair, Joseph Bielitzki, DVM, this letter is signed by:

Signature applied by Janice Turchin on 02/16/2011 10:09:37 AM EST

IRB Coordinator

APPENDIX B: ORANGE COUNTY PUBLIC SCHOOLS DEPARTMENT FOR ACCOUNTABILITY, RESEARCH, AND ASSESSMENT RESEARCH REQUEST FORM

Submit this form and a copy
of your proposal to:
*Accountability, Research, and
Assessment
P.O. Box 271
Orlando, FL 32802-0271*

Orange County Public Schools

RESEARCH REQUEST FORM

▎ RECEIVED MAR 2 9 2011

Your research proposal should
include:
- Project Title
- Purpose and Research Problem
- Instruments
- Procedures and Proposed Data
  Analysis

Requester's Name__Maria Jose Soong_____   Date__03/23/2011_____

E-mail__mariajose.soong@ocps.net_____   Phone__321-662-3539_____

Address__9304 Mustard Leaf Drive, Orlando, FL 32827_____
    Street   City, State   Zip

Institutional Affiliation__University of Central Florida_____

Project Director or Advisor__Dr. Stephen Sivo_____   Phone__407-823-4147_____

Degree Sought: ☐ Associate   ☐ Bachelor's   ☐ Master's   ☐ Specialist
(check one)   ☒ Doctorate   ☐ Not Applicable

Project Title:__Tier I RtI for English Language Learners with Language Deficits_____

ESTIMATED INVOLVEMENT

PERSONNEL/CENTERS	NUMBER	AMOUNT OF TIME (DAYS, HOURS, ETC.)	SPECIFY SCHOOLS BY NAME AND NUMBER OF TEACHERS, ADMINISTRATORS, ETC.
Students			
Teachers			
Administrators			
Schools/Centers			
Others (specify)	15	1 hour	Multilingual One-Way Center's ESOL CTs

Specify possible benefits to
students/school system:__Indirect benefits include the opportunity to assist in gathering information regarding the
effectiveness of ESL programs for various learners._____

ASSURANCE

Using the proposed procedures and instrument, I hereby agree to conduct research in accordance with the policies of the
Orange County Public Schools. Deviations from the approved procedures shall be cleared through the Senior Director of
Accountability, Research, and Assessment. Reports and materials shall be supplied as specified.

Requester's Signature_____

Approval Granted: ☑ Yes   ☐ No   Date:__4-11-11_____

Signature of the Senior Director for
Accountability, Research, and Assessment_____

NOTE TO REQUESTER: When seeking approval at the school level, a copy of this form, signed by the Senior Director, Accountability,
Research, and Assessment, should be shown to the school principal who has the option to refuse participation depending upon any
school circumstance or condition. The original Research Request Form is preferable to a faxed document.

Reference School Board Policy GCS, p. 249   OCPS1044ARA (Revised 2/10)

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