PRE-KINDERGARTEN INSTRUCTIONAL CLASSROOM INTERACTIONS ASSOCIATED WITH PHONOLOGICAL AWARENESS AND VOCABULARY KNOWLEDGE

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DEDICATION

To my Lord and Savior Jesus Christ and la Virgen de La Caridad

With God, all things are possible.

To my husband Joe, the love of my life, for believing in me and supporting my dreams.

To my son José Francisco for providing me with the precious gifts of love, joy, and purpose.

To my mother, grandparents, sister, aunts, and uncles for providing a loving secured attachment that makes me who I am and instilling a passion for education.

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ABSTRACT

MARGARITA CUERVO

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The quantitative study examined 325 classroom scores of phonological awareness and vocabulary knowledge across time at the beginning (BOY), middle (MOY), and end (EOY) of the year in Pre-kindergarten (Pre-K). The study also investigated the association between Pre-K classroom instructional interactions that supported phonological awareness and vocabulary knowledge. Structural equation modeling autoregressive results yielded that vocabulary scores at BOY, MOY, and EOY were significantly associated with the specific time points and stable across time. The phonological awareness scores at BOY, MOY, and EOY were significantly associated with the specific time points but not stable across time. Cross-lag analyses revealed that phonological awareness and vocabulary were not bi-directional. Phonological awareness was associated with vocabulary across all time points, but vocabulary was not associated with phonological awareness and showed no relationship across time. Moderation analyses showed that instructional support classroom interactions did not moderate Pre-K classroom scores of vocabulary and phonological awareness.

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CHAPTER I

INTRODUCTION

Research shows a strong relationship between children's language and literacy development (Ansari & Pianta, 2018; Carr et al., 2019; Clay, 2014; Goble et al., 2019; Snow et al., 1998). Young children acquire language and literacy skills through conversational experiences with caregivers and teachers. Caregivers and teachers employ language techniques that are attuned to children's learning and development (Clay, 2014). Piaget (1926/1959) contended that children construct social knowledge through interactions with others, and Bruner (1981) emphasized that joint attention through back-and-forth communication between caregiver and children advance their oral language development. These back-and-forth exchanges consist of utterances that promote intentions, conventions, understanding, suitability, trustworthiness, and constancy to the meaning-making transaction (Bruner, 1983). Children's utterances provide caregivers with information on the knowledge processes and caregivers respond with language techniques to advance children's back-and-forth exchanges (Piaget, 1926/1959). Language and literacy afford humans the abilities to express emotions, needs, and knowledge.

The human brain receives and processes information in patterns (Lindfors, 2019). Patterns portray a vital role in the language acquisition process and literacy learning (Lindfors, 2019). Back-and-forth interactions form patterns of turn taking using oral language that transfer to reading and writing skills over time (Pinnell & Fountas, 1998). Young children communicate with caregivers through smiles, gestures, and sound utterances. Caregivers respond to the children's utterances and gestures to meet the children's needs and advance the language acquisition process. Early relationships provide a forum for young children to learn the names and functions of objects through interactions and games, such as peek-a-boo. Children participate

in a language apprenticeship of observing and applying speech patterns in these back-and-forth interactions (Lindfors, 2019). Caregivers position their relationships in conversation partnerships offering words, information, intentions, feelings, and identities. Brain research using functional magnetic resonance imaging demonstrated that the number of children's conversational turns in interactive dialogue correlated with increased brain activity (Massachusetts Institute of Technology [MIT] News, 2018). Moreover, research shows that back-and-forth exchanges promoted subsequent increased literacy learning (Wells, 1986). These findings contrast prior research of social class impacting language development with the number of words that children heard (Hart & Risley, 1995; Wells, 1986).

Oral language and literacy are complementary and utilize back-and-forth interactions to advance the language systems of syntactic, semantic, and phonological (Kucer, 2014; Lindfors, 2019; Pinnell & Fountas, 1998; Snow, 1983). Oral language exchanges meaning through back-and-forth conversations and literacy transacts meaning through text. Yet, both develop though social interactions. The disciplines of language and literacy contain maturational restraints as evident in the monumental effort and time it takes for children to acquire both disciplines. The semantic system involves the deep structure and meaning processes of receptive and expressive vocabulary learning (Lindfors, 2019). Interactions between children and caregivers augment the semantic system to express and obtain meaning during conversations, reading skills, and writing abilities. The syntactic system refers to the surface structure of the standard of language of rules, patterns, and word order (Kucer, 2014). Young children's hard-wired brains search language patterns to develop an awareness of punctuation, verb tenses (past, present, and future), and word order related to subjects and predicates in a sentence by the commencement of kindergarten (Lindfors, 2019). The phonological system comprises the sounds of language. Children generate

phonemes or sounds to create words then learn to apply their understanding to interpret words in sentences. Young children converge and synthesize the critical processes of syntactic, semantic, and phonological during language and literacy development (Lindfors, 2019) Through the phonological system, children utter sounds to create words then employ the syntactic process of stringing the words in the correct order to form sentences. The semantic system promotes the understanding of the meaning of the word or words in the sentences that the children utter.

Young children with robust oral language skills tend to demonstrate higher reading and writing skills (Clay, 2014). In contrast, children with low oral language skills experience challenges in learning to read and write (Clay, 2014). Oral language skills, meaning words spoken aloud, act as an essential component in children becoming literate, successful communicators and lifelong learners. Young children, ages 3 to 5 years (Pre-kindergarten [Pre-K]) are in a critical period to develop oral language, and the literacy skills of phonological awareness and vocabulary learning through social interactions at home and in a classroom (Ehri & Roberts, 2006; Phillips et al., 2008). Phonological awareness (PA) uses oral language skills to understand the sounds of spoken languages as words (Bennett-Armistead et al., 2005). Some of the PA skills include syllabication, onset rime, rhyming, alliteration, and phonemes. Vocabulary refers to understanding the context and meaning of words (Bennett-Armistead et al., 2005). Young children learn the literacy skills of PA and vocabulary through back-and-forth meaningful oral language interactions and playful activities. Children acquire the sound structures and meaning of words through language rich classroom experiences involving singing, poems, nursery rhymes, dramatic or pretend play, puppets, story book listening station, and conversations with a partner, in a small group, and in large groups of peers or with a teacher (Moravicik, 2013). Children with robust PA and vocabulary at the commencement of

kindergarten predict subsequent literacy success in speaking, listening, reading, and writing (Adams, 1990; Ehri et al., 2001; Snow et al., 1998).

High-quality instructional support describes classroom interactions strategies that advance cognitive and language development (Pianta et al., 2008). For this research, instructional support encompasses the classroom interactions of concept development, effective quality of feedback, and language modeling techniques (Pianta et al., 2008). High-quality concept development strategies include caregivers and teachers asking open-ended questions that promote higher order thinking skills. Effective quality of feedback refers to caregivers and children engaging in back-and-forth oral language interactions that augment critical thinking. Language modeling consists of employing language stimulating techniques of repeating and extending the child's responses, providing words with actions, and advancing children's vocabulary and conversational skills. Pre-K programs that demonstrate high-quality classroom interactions during instructional support influence future literacy success (Ansari & Pianta, 2018; Carr et al., 2019; Goble et al., 2019; Peisner-Feinberg et al., 2014).

Statement of the Problem

Ineffective instructional techniques adversely affect literacy development and situate children at risk for consequent reading deficiencies (Children's Learning Institute at University of Texas Health at Houston [CLI at UT Health at Houston], 2010; Yopp & Yopp, 2009). Early childhood educators may not understand the importance and lack the techniques to implement mid- to high-quality instructional support, effective classroom interactions, that promote literacy skills such as vocabulary and PA. Ineffective instructional techniques consist of teachers rarely implementing critical thinking questioning and oral language facilitation techniques to promote children's cognitive and language development. Studies that employed an observational tool

assessing instructional support interactions in Pre-K classroom environments reported mostly low- and few mid-quality teacher-child interactions (Carr et al, 2019; La Paro et al., 2004). Carr et al. (2019) found that 17% of Pre-K and 7% of kindergarten classrooms scored at mid- or high-quality in instructional support. Mid- and high-quality instructional support interactions refer to teachers implementing critical thinking questioning and oral language facilitation techniques to promote children's cognitive and language development. This indicates the problem of children not experiencing high-quality interactions that result in academic success (Carr et al, 2019; La Paro et al., 2004). Research on multi-state, publicly and federally funded Pre-K programs show that high-quality classroom interactions in instructional support influence subsequent academic success (Carr et al., 2019; Goble et al., 2019; Peisner-Feinberg et al., 2014).

The findings from this study might yield evidence supporting the need to teach instructional techniques so early childhood teachers can increase Pre-K children's skills in vocabulary and PA. High-quality instructional support provided by teachers may lead to robust vocabulary and PA skills which, in turn, promote kindergarten readiness of children prepared to learn the kindergarten outcomes or objectives. Also, this investigation of low-, mid-, and high-quality instructional techniques and interactions could enable the identification of specific professional development needs that support teachers' understanding of high-quality instructional interactions that advance literacy learning. Children with strong PA and vocabulary skills at the commencement of kindergarten predict children's subsequent reading and writing success (Adams, 1990; Ehri et al., 2001; Snow et al., 1998); therefore, learning about quality instructional techniques would be vital for Pre-K teachers.

Purpose of the Study

The research study has two purposes. The first is to investigate Pre-K children's vocabulary and PA knowledge across one academic year. The second purpose is to examine the association between instructional classroom interactions that support children's literacy learning of vocabulary and PA.

Significance of the Study

The study will boost the scant research on effective instructional classroom interactions that impact Pre-K children's literacy success. Effective instructional techniques and interactions in Pre-K that impact children's literacy learning include PA and vocabulary skills (Ansari & Pianta, 2018; Carr et al., 2019; Goble et al., 2019; Vernon-Feagans et al., 2019). The study will examine the Pre-K children's on-track classroom benchmark scores of vocabulary and PA across three time points in an academic year: beginning of the year (BOY), middle of the year (MOY), and end of the year (EOY). On-track benchmark classroom scores refer to the combined scores of children in a single classroom that are at or above identified scores that indicate an understanding of the expected skill assigned to a grade level (Landry et al., 2014). Therefore, identifying the on-track benchmark classroom scores across three points in a Pre-K academic year provides an indication that children's understanding of the vocabulary and PA skills. The study focus of vocabulary and PA skills corresponds to the existing research on the critical period of learning the foundational language skills during the Pre-K years (Clay, 2014; Ehri & Roberts, 2006; Snow et al., 1998; Philips et al., 2008). Specifically, students with strong PA and vocabulary at the outset of kindergarten forecast subsequent literacy achievements (Adams, 1990; Ehri et al., 2001; Snow et al., 1998).

Examining the association between vocabulary and PA may reveal instructional strategies that advance literacy skills. Additionally, the proposed study may result in learning the impact between instructional classroom interactions that support the literacy skills of vocabulary and PA, which will strengthen the scant research. This coincides with past research on instructional support positively impacting Pre-K literacy and language learning (Burchinal et al., 2010; Mashburn et al., 2008) due to high levels of classroom instructional interactions supporting children's higher scores in literacy and language (Bulotsky-Shearer et al., 2020). The results of the research study may help build a foundation of effective instructional classroom interactions associated with PA and vocabulary knowledge in Pre-K. The study will add to the research base of the importance of effective Pre-K instruction that promotes readiness to be successful at the commencement of kindergarten and beyond.

Theoretical Perspectives

Piaget's (1936/1952) cognitive development theory and Bruner's (1966) social interactionist theory will provide the theoretical lens that guides this research on the associations of effective teacher-child interaction and literacy learning. Piaget's (1936/1952) theory posited that cognition develops through the progression of four sequential stages over time. The preoperational stage encompasses the ages from 2 to 7 years which includes the Pre-K children in this research study. During the preoperational stage, children develop language, representations, and conceptual thinking while constructing knowledge and augmenting schemas through assimilation and accommodation on their language and literacy experiences. Schemas are the mental structures that store and organize cognition (Piaget, 1936/1952). Children assimilate new learning by merging acquired knowledge into existing schemas (Piaget,

1936/1952; Wadsworth, 2004). Children make accommodations by constructing new schemas for new learning (Piaget, 1936/1952; Wadsworth, 2004).

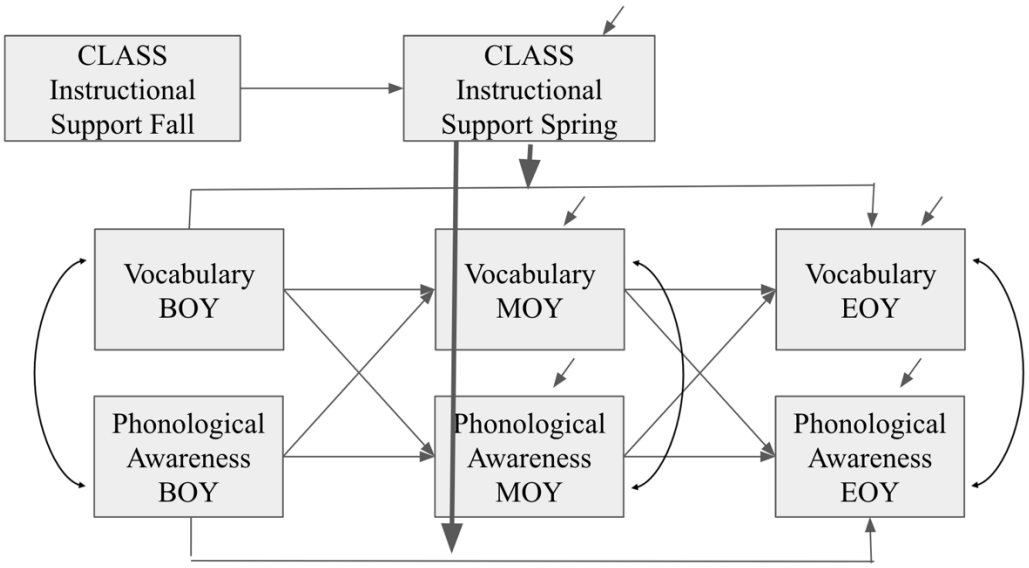
Bruner's social interactionist theory of language development is based on three stages of cognitive development: the enactive, iconic, and symbolic, and the concept of Language Acquisition Support System (LASS). LASS postulates that child language is learned through social experiences and interactions with people that support language learning (Bruner, 1981; Carpendale et al., 2018). These back-and-forth social interactions convey intentions, emotions, information, ideas, and knowledge to create meaning as children learn language. Caregivers and teachers employ the LASS to model and provide input on the language systems of semantics, syntax, and pragmatics as the more knowledgeable conversational partner (Bruner, 1981). Pragmatics refers to the functions, intentions, or purpose of language (Kucer, 2014). Bruner (1981) contended that children acquire language through the system of pragmatics in the manner that the utterances are employed to influence others. The more knowledgeable conversational partner also provides scaffolding or assistance for the language systems of syntactic (sentence structure) and semantics (meaning).

Research Questions

The study constructs or variables for this research study are visually represented by using the specification process to generate the research questions and hypothesis for the Structural Equation Modeling (SEM) analysis (Kline, 2016). This visual representation of the SEM model renders a recursive model with unidirectional causal effects and uncorrelated error terms or disturbances. Figure 1 illustrates a visual representation of the SEM model for the Classroom Assessment Scoring System (CLASS) instructional support variables and the literacy variables of phonological awareness and vocabulary.

Figure 1

Structural Equation Conceptual Model of CLASS Instructional Support and Literacy Skills



Note. SEM Cross-lag Autoregressive analysis of Vocabulary and Phonological Awareness. Moderation analysis of CLASS Instructional Support impacting the relationship from BOY and EOY scores of Vocabulary and Phonological Awareness.

Research questions include:

1. Are on-track beginning of the year (BOY) benchmark classroom scores of Vocabulary associated with middle of the year (MOY) on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?
2. Are on-track BOY benchmark classroom scores of Phonological Awareness associated with MOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?

3. Are on-track MOY benchmark classroom scores of Vocabulary associated with end of year (EOY) on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?
4. Are on-track MOY benchmark classroom scores of Phonological Awareness associated with EOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?
5. Are Pre-Kindergarten English and Spanish CLASS instructional support scores from fall associated with spring classroom scores?
6. How do Pre-Kindergarten CLASS Spring Instructional Support scores moderate the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and Phonological Awareness?

The research questions 1, 2, 3, and 4 investigate the stability across time for the variables of vocabulary and phonological awareness taken at three time points of BOY, MOY, and EOY. Research question 5 examines the instructional support scores collected in the fall and spring. Research question 6 investigates the existing findings related to any associations among instructional support interactions and their impact on vocabulary and PA learning.

Definition of Terms

1. Alliteration refers to two or more words that begin with the same sound (Fountas & Pinnell, 2017).
2. Benchmark scores refer to set scores or cut points that indicate an understanding of the skill (Landry et al., 2014).

3. Onset rime targets the segments within the syllables. The onset refers to the beginning sound or sounds before the vowel, and the rime refers to the first vowel and the sounds that follow the vowel (Fountas & Pinnell, 2017).
4. On-track benchmark scores means that the child scored at or above the set scores or cut points for specific skills expected based on the assigned grade level (Landry et al., 2014).
5. Phonemes refer to the small units of sounds (Goswami & Bryant, 2016).
6. Phonological Awareness (PA) refers to the understanding of individual and groups of sounds in words (Bennett-Armistead et al., 2005). The PA components investigated in the study consist of syllabication, onset-rime, alliteration, and rhyming.
7. Pre-K, Pre-kindergarten, or preschool refer to children ages 3 to 5 years that attend a learning program the years before official school entry in kindergarten. The programs include privately owned childcare centers or homes, and private, public, and district half day and full day learning centers (Copple & Bredekamp, 2008).
8. Rhyming refers to two or more words that have the same sound at the end (Fountas & Pinnell, 2017).
9. Syllabication refers to a word part pronounced with a single uninterrupted voice sound (Fountas & Pinnell, 2017).
10. Vocabulary refers to the collection of words comprehended when listening and reading and/or produced when speaking and writing (Bennett-Armistead et al., 2005).

Delimitations

The following delimitations apply to the study.

1. A purposive sampling method will be employed to attain the sample size.

2. The study is limited to Pre-K students, 4 to 5 years of age.
3. The study utilizes secondary data from an independent school district (ISD) from the school term 2021-2022.
4. Classrooms from partnerships with local childcare sites and agencies, Montessori schools, Head Start, and exceptional education classrooms that serve atypical developing children will be excluded from the study sample.

Assumptions

The following assumptions apply to the study.

1. The instrument of CIRCLE CLI Engage accurately measures the literacy skills of vocabulary and PA in Pre-K children.
2. The instrument of CLASS accurately measures the quality of Pre-K classroom interactions in instructional support.

Summary

The chapter introduced the importance of caregiver and child interactions on language and literacy development. The language systems of syntactic, semantic, and phonology were examined and applied to the acquisition of language and literacy. Effective instructional classroom interactions that advance the literacy skills of PA and vocabulary of children using high-quality teacher instructional supports were discussed. The lack of research on effective instructional classroom interactions that support Pre-K teachers created a rationale for the study and research questions. The delimitations, assumptions, and definition of terms provided information about the study. The theoretical perspectives and the literature review of effective classroom instructional support interactions and the literacy skills of PA and vocabulary are presented in Chapter 2.

CHAPTER II

LITERATURE REVIEW

The literature review will examine research related to effective instructional classroom interactions and children's literacy learning in Pre-K. The theoretical frameworks of Piaget's theory of cognitive development and Bruner's social interactionist theory will provide the theoretical lens to guide the study. The instructional support classroom interactions of concept development, quality of feedback, and language modeling sections will encompass a review of the existing research. In addition, the review of vocabulary and PA skills of syllabication, alliteration, rhyming, and phonemes will support the proposed empirical relationships of the skills influencing each other.

Theoretical Frameworks

The theories of Jean Piaget's theory of cognitive development and Bruner's social interactionist theory will be analyzed and synthesized to guide the research on the associations of effective teacher-child interaction and literacy learning. Specifically, the theory of cognitive development provides a framework for examining PA and vocabulary knowledge. The LASS, a concept related to the social interactionist theory, presents a guide for effective instructional classroom interactions that promote the literacy skills of PA and vocabulary. The theoretical perspectives will be utilized as a framework to understand the literacy learning of vocabulary and PA through effective instructional classroom interactions in Pre-K.

Piaget's Cognitive Development Theory

Jean Piaget's theory of cognitive development postulates that the development of cognition arises through four fixed sequential stages (Piaget, 1936/1952; Wadsworth, 2004). Children progress through the stages by interacting with the environment and constructing

knowledge through experiences and actions to advance their cognition. The stages include sensorimotor intelligence, preoperational thought, concrete operations, and formal operations (Piaget, 1936/1952; Wadsworth, 2004). The preoperational thought stage ranges from 2 to 7 years of age encompassing the Pre-K years. The child's thought process is dominated by perception and characterized as prelogical (Piaget, 1936/1952; Wadsworth, 2004). Experience refers to physical, logical-mathematics, and social knowledge which the child actively constructs (Pulaski, 1980). Children obtain physical knowledge through the senses, logico-mathematics knowledge by the agency of actions, and social knowledge via interactions with others. The actions consist of children constructing knowledge by assimilating and accommodating language and literacy experiences to augment schemas, the mental structures that store and organize cognition to obtain equilibrium (Ginsburg & Opper, 1979; Piaget, 1936/1952; Wadsworth, 2004). Through the construction aspect of assimilation, children receive new stimuli or knowledge and act and merge it into their existing schemas or cognitive patterns (Wadsworth, 2004). Equilibrium maintains cognitive stability or balance between assimilation and accommodation (Piaget, 1936/1952). At times, the new stimuli or knowledge does not merge into the existing schemas or cognition, and the reconstruction aspect of accommodation alters and constructs a new schema to acquire equilibrium (Piaget, 1936/1952).

Concepts of the Preoperational Thought Stage

Cognitive concepts that apply to vocabulary and PA learning in the preoperational thought stage include symbolic function, egocentrism, conservation, centration, and transformational reasoning. Symbolic function refers to the usage of symbols and signs (Piaget, 1964/1967; Wadsworth, 2004). Symbols resemble the represented object or experience, such as drawings, and signs are abstract and dissimilar to its representation, such as letters. Symbolic

function incorporates deferred imitation, symbolic play, drawing, mental imagery, and spoken language (Piaget, 1964/1967; Wadsworth, 2004). Children utilize vocabulary words to engage in symbolic play as a mode for imitation and communication ideas and sentiments. With the direction from a teacher, children utilize drawing to represent objects to augment vocabulary learning and PA skills of rhyming and alliteration. Children employ mental images of psychological visualization of objects or experiences to advance the learning of new words. The cognitive concept of egocentrism or the inability to perceive the viewpoints of others restricts the development of intellectual processes hindering PA learning. Young children may choose an object based upon a preferred attribute rather than the correct PA skill. In the same manner, young children choose vocabulary words based on preferences and viewpoints such as their favorite colors or toys as opposed to the correct usage or meaning of the word.

Preoperational children experience challenges with conservation, centration, and transformational reasoning (Feldman, 2012). Conservation is the understanding of the physical arrangement or appearance of an object that is extraneous to the quantity (Wadsworth, 2004). Children experience difficulties in identifying a multisyllabic word as a single word. The concept of centration refers to the child focusing on one attribute, such as categorizing vocabulary picture cards by color. Transformational reasoning is the evolution of states (Feldman, 2012). Children in the preoperational stage detect the initial and ending states but overlook the intermediate state (Feldman, 2012). Transformational reasoning is exemplified by children focusing on the initial and ending sounds in words and struggling with the middle sounds. Pre-K children's developmental stage of preoperational thought influences the acquisition of the cognitive concepts of symbolic function, egocentrism, conservation, centration, transformation, and ability to learn vocabulary and PA skills.

Spoken language is a form of representing and communicating with people about objects, and experiences (Wadsworth, 2004). Children engage in PA as they play with the sounds in spoken language and augment their vocabulary knowledge as they participate in spoken language with others. Preoperational children who are 3 to 6 years of age engage in socialized speech and speak of self or other topics of conversation with contingency (Piaget, 1926/1959). The language classifications of adapted information, questions and answers convey the children's intellectual processes (Piaget, 1926/1959). Intellectual discourse between the children consists of mainly factual or descriptive exchanges, but children communicate causality in the exchanges with adults (Piaget, 1926/1959). The children's speech indicates the teacher's usage of intervention or language facilitation techniques and the experiences provided to the children to engage in back-and-forth exchanges (Piaget, 1926/1959). The children's language relies on developmental and external social factors of the relationship with an adult (Piaget, 1926/1959). Learning language results in prompt and abiding consequences to the child because the caregiver satisfies the child's exigencies (Wadsworth, 2004).

Bruner's Mental Modes of Representation

Bruner's model of cognitive development is depicted through the sociolinguistic theory that includes three mental modes of representation: enactive, iconic, and symbolic (Bruner, 1966). The modes render the manner which knowledge is stored and encoded in memory based on interactions with others (Olson, 2007). The application of the modes of representation shifts to accommodate new learning (Olson, 2007). Learning novel skills require the application of the lower modes of enactive and iconic. For example, the use of pictures aid children in acquiring the meaning of the novel vocabulary words. The modes indicate developmental age ranges, but the level of experience dictates the application of a specific mode (Olson, 2007). Less

experiences require the use of enactive and iconic while more experiences afford the operation of the higher mode of symbolic (Olson, 2007).

The enactive mode involves learning from physical responses or habits and thinking stems from physical actions (Bruner, 1966). Children engage in the enactive mode as they act out the vocabulary words. The iconic representation involves images that stand for other things (Olson, 2007). Information is processed and stored in memory as sensory images (Bruner, 1966). The iconic mode encompasses ages 1 to 6 years (Olson, 2007), and the Pre-K children fall into the range. Children learn through experiences using the senses. An example consists of the children applying sensorial descriptions of the new vocabulary word such as smell, taste, texture, and visual characteristics. The symbolic mode includes children ages 7 years and older, and information is encoded and stored in the form of symbols, such as letters and numbers (Olson, 2007). Learning is represented in words and language (Bruner, 1966). This depicts learning through reading and writing. Bruner attributes the transfer of modes from iconic to symbolic as developmental and cultural through language learning (Olson, 2007).

Language Acquisition Support System

Bruner's theory of language development, LASS, stipulates that language is learned through social experiences of adult-child interactions (Carpendale et al., 2018). Bruner believed that young children acquire language through formats (Bruner, 1966; Olson, 2007). Adult-child social interactions are a format for language learning if it involves action and objects, a flexible repetitive back-and-forth with anticipation, turn-taking for vocalizing, and varying role reversals during the exchange (Bruner, 1966). The back-and-forth utterances constitute intentions, conventions, and felicity conditions of understanding, appropriateness, sincerity, and adherence

to the transaction in meaning-making (Bruner, 1983). Caregiver and children interactions afford children the opportunity to learn language and use language to create meaning and learn.

Bruner's (1983) view of language acquisition stated that caregivers and teachers employ the LASS in contextualized talk modeling the conventions of language to gradually advance oral language development. The LASS of instructional support classroom interactions promotes the development of the children's literacy skills of vocabulary and PA. Bruner (1981) contended that children acquire language through the system of pragmatics by the manner that the utterances are employed to influence others. Pragmatics is evident in young children communicating through gestures and utterances prior to signifying words to objects, people, and events in semantics, and stringing the conventional order and usage of words in syntax. The systems of syntactic and semantics develop afterwards as children hear the structure of language and the meaning of words through back-and-forth conversations. The systems of pragmatic, syntactic, and semantics support the development of each other and are not derivative in nature (Bruner, 1981).

Instructional Concepts

Bruner (1960) stated the "hypothesis that any subject can be taught effectively in some intellectually honest form to any child at any stage of development" (p. 33). This can be accomplished through the instructional concepts of scaffolding, discovery learning, and application of the spiral curriculum (Bruner, 1960). Scaffolding describes the aid the children receive in acquiring a skill (Olson, 2007). Knowledge of the children's intellectual development is essential in providing aid and requires presenting and translating concepts at the children's developmental level to attain comprehension (Bruner, 1960). Early childhood educators may teach new vocabulary using picture cards. The pictures serve as scaffolds to help the children learn and remember the word. The scaffolding aid consists of assistance, hints, and questioning

to support the children in managing the understanding that cannot be achieved independently. Teachers remove the scaffolds once the children acquire the learning and independently complete the task. Scaffolding is based on the work from Lev Vygotsky's Zone of Proximal Development (ZPD) of the period between the adult assisted dependent and independent application of knowledge or task (Bruner, 1978; Olson, 2007). The term of scaffolding was adopted from the engineering model of the scaffolds placed in the construction of buildings and debuted in literature from Woods et al. (1976) describing the tutors and Pre-K children's interactions to aid in building a pyramid puzzle (Olson, 2007).

Discovery learning or inquiry-based instruction encourages children to produce information independently, verify the information through sources, and attain additional information in the process (Bruner, 1960). Pre-K children learn PA skills through discovery learning in the learning centers or designated areas in the classroom with child-directed activities performed in small groups independently. For example, an activity in the ABC learning center may include children clapping syllables of multisyllabic pictures and verifying the number of syllables on the back of the card. The spiral curriculum structures concepts from simple to complex as the concepts are revisited (Olson, 2007). The skills in the *Texas Pre-Kindergarten Guidelines* follow the concept of spiral curriculum of introducing the skills from simple to complex and recommending repeated exposure to the skills (Texas Education Agency [TEA], 2015). For example, PA instruction consists of progressing from receptive language, such as rhyme identification, to expressive language of rhyme production.

Vocabulary

Snow (1983) emphasized that oral language and literacy are similar and complementary. The pivotal window for language and vocabulary development occurs during the early Pre-K

years (Wasik & Iannone-Campbell, 2012). Literacy including vocabulary knowledge requires the acquisition of the systems of semantic, syntactic, and pragmatic (Lindfors, 2019; Snow, 1983). Children engage in conversations to develop vocabulary and advance semantics through receptive vocabulary of the understanding of words heard and expressive vocabulary of the understanding of words uttered in speech. The syntactic system augments vocabulary learning with children developing an awareness of the novel word utilized in context for punctuation, verb tense of past, present, and future, and word order of subjects and predicates in a sentence. The pragmatic system promotes vocabulary knowledge in necessitating an exchange of meaning through back-and-forth conversation in social interactions.

Semantic System

Children's conversation exchanges with caregivers augment the semantic system. The semantic system focuses on the meaning in language and encompasses vocabulary, the knowledge and meaning of words (Kucer, 2014). The joint action formats of back-and-forth interactions between caregivers and children contribute to meaning making and vocabulary development (Bruner, 1983; Snow et al., 1998). Research from Hart and Risely (1995) reported a 500-word deficit between 3-year-old children from welfare families that heard task or referent speech as compared to their peers from working families who heard back-and-forth conversations. Recent findings showed evidence of the word gap in young children at 18 months (Fernald et al., 2012). In contrast, brain research in children between the ages of 4 and 6 found that back-and-forth conversation turns impacted brain activity (MIT News, 2018) and subsequent vocabulary learning (Wells, 1986). The demographic factors including the socio-economic status of the families did not impact brain activity with the number of words that the children heard (MIT News, 2018).

Children increase vocabulary depth through interactions of back-and-forth exchanges with the vocabulary word. Vocabulary depth refers to quality of knowing the meaning of the word, and vocabulary breadth refers to quantity of the number of words children recognize. Fast mapping consists of little instructional exposure in vocabulary learning. Hadley et al. (2018) conducted research on the acquisition of vocabulary knowledge using fast mapping. The results yielded increased vocabulary breadth but decreased levels of word knowledge and vocabulary depth. The research supports the construct of back-and-forth interactions to promote vocabulary growth.

Syntactic System

Children actively participate as apprentices in back-and-forth interactions with adults as they notice and adopt language patterns to promote the syntactic system (Lindfors, 2019). The extent of complex sentences employed by caregivers and teachers influence the amount of children's vocabulary growth (Farrow et al., 2018; Hoff, 2003; Pelatti et al., 2013). Farrow et al. (2018) found a significant relationship between the teachers' complex use of language during the morning message and small group lessons. Research from Dickinson & Porche (2011) on classroom interactions yielded 80% teacher-directed talk and fewer than 2% of student-led conversations (Wasik & Iannone-Campbell, 2012). Early childhood educators need to increase student- directed talk and provide opportunities for children to engage in back-and-forth interactions to enhance language and vocabulary learning.

Pragmatic System

Young children employ language as an instrument for the fulfillment of intentions in back-and-forth interactions with parents and caregivers (Halliday, 1969). The pragmatic system controls the employment of the appropriate functions of language in specific contexts (Kucer,

2014). Young children acquire the language functions of instrumental, regulatory, interactional, personal, heuristic, imaginative, and informative through back-and-forth exchanges in early interactions (Kucer, 2014). Vocabulary learning refers to the pragmatic function of informing or communicating information. Research (Wells, 1986) from a longitudinal study on children from 1 to 10 years of age found a relationship between academic learning and children's language development using interactive storytelling as an instructional support in the classroom. The children's language development increased in being able to effectively narrate an event, describe scenes, follow directions, understand teacher talk, and learn vocabulary (Wells, 1986). Teachers engaged in conversational exchanges with students to provide information on concepts, practices, functions, and different perspectives (Johnston, 2004; Kucer, 2014; Wells, 1986).

Back-and-forth conversations during interactive read alouds showed a significant association between inferencing and vocabulary knowledge (Lennox, 2013). Inferencing classifies as part of the heuristic function of language. Neuman and Dwyer (2009) established that instructing vocabulary words in taxonomies advanced inferencing and memory. For example, teachers provide the taxonomy of insect to the novel vocabulary word of grasshopper by explaining that a grasshopper is an insect. In addition, the utilization of context, perceptual and functional descriptions of vocabulary words increased semantic processing of vocabulary depth as compared to breadth (Hadley et al, 2018; Wasik & Iannone-Campbell, 2012). Children assimilate and accommodate new word learning by actively constructing knowledge in multiple opportunities of back-and-forth conversations with others through descriptions of taxonomy, context, perceptual, and functional. Research shows that vocabulary is associated with PA (Ramachandra et al., 2011; Read et al., 2014).

Phonological Awareness

Early childhood educators utilize read-aloud stories to advance vocabulary and PA skills. Specifically, the PA skill of rhyming is predominantly found in many children's stories. Findings show that stories with rhyme emphasized vocabulary words and contributed to word identification in a sample size of 24, 2- to 4-year-old children (Read et al., 2014). Rhyming increased memory by evoking explicit words resulting in new word learning (Read et al., 2014). Rhyming tasks of matching objects that end with the same sounds promoted phonological sensitivity of rhyme awareness and novel word learning in Pre-K (Ramachandra et al., 2011; Read et al., 2014). Specifically, 4-year-old children from a sample size of 40 applied phonological sensitivity by employing phonological understanding and cognition to perform at a metacognitive level (Ramachandra et al., 2011). The relationship between vocabulary and phonological sensitivity is bi-directional with each influencing the other (Storkel & Morrisette, 2002). Children's vocabulary influenced phonological acquisition and in turn phonological awareness influenced vocabulary acquisition.

Young children acquire PA through the developmental progression skill levels of syllables, onset rimes, and phonemes (Thatcher, 2010; Treiman & Zukowski, 1996). The acquisitions of the skills overlap, and children learn the larger units of syllables and onset rime before the smaller units of phonemes (Anthony et al., 2003; Bruce, 1964; Fox & Routh, 1975; Liberman et al., 1974). The PA units of syllabication, onset rime, rhyming, and alliteration consist of large units and are easier to acquire as opposed to the smaller individual sounds of phonemes (Goswami & Bryant, 2016). Phonemic awareness develops after learning to read and strengthens as result of reading (Ehri & Wilce, 1980; Goswami & Bryant, 2016). Children need to know the individual sounds of the letters in a word to decode the sounds to read the word.

Children gain an increased awareness of the sounds as the words are decoded. All children progress at their own developmental timelines. Children's home exposure to a PA skill promotes the acquisition of the skill through repeated practice of the skill. Research states that children exposed to nursery rhymes in the home environment displayed increased awareness to phonological tasks, such as rhyming and alliteration (Goswami & Bryant, 2016).

Syllabication

Syllabication refers to segmenting or blending the parts of a word or unit sounds. Segmenting syllables and phonemes require one-to-one correspondence and children may display the skill by tapping the number of syllables or phonemes (Goswami & Bryant, 2016). Pre-K students could segment the word cupcake by saying and clapping the syllable of cup and saying and clapping the syllable of cake. PA research states that pre-literate children develop syllabication awareness preceding phonemic awareness in the English and Spanish languages (Goikoetxea, 2005; Goswami & Bryant, 2016; Liberman et al, 1974; Treiman & Baron, 1981). The findings support the acquisition of the larger units before the smaller units. Neuroimages on phonological brain processing revealed that young children's voice signals link to syllables and speech rhythm as opposed to phonemes or sounds of letters (Hruby & Goswami, 2011). Research by Liberman et al. (1974) utilized tapping tasks, and Treiman and Baron (1981) employed tokens for 5-year-old children to accurately depict one-to-one correspondence in syllabication tasks. The findings showed that children in both studies struggled with the phoneme tasks (Liberman et al., 1974; Treiman & Baron, 1981). Piaget (1936/1952) postulated that one-to-one correspondence is readily comprehended by the ages of 5 or 6 years old. In addition, syllables are large grain units that are easier to acquire, and phonemes are smaller grain units which young children exhibit insensitivity to individual phonemes. Syllables segmented at the vowel units depict onset rime.

Moreover, linguistic opportunities, such as rhythmic nursery rhymes promote the understanding of syllabication sound transmissions in brain function (Goswami & Bryant, 2016). Research from Leong and Goswami (2015) investigated children's learning of syllables and rhythm measured by a metronome, device that produces audible steady sounds at a regular interval of time. The findings showed that freely vocalized nursery rhymes yielded 82% of children's syllable knowledge, in contrast to nursery rhymes vocalized in a metronome rhythm accounted for 98% of children's syllable knowledge (Leong & Goswami, 2015). The metronome rhythm follows a melodic pattern and segmenting words into syllables also adheres to patterns. The findings showed the importance of incorporating music and rhythm to the children's learning of syllables. Pre-K children could clap the syllables of a word in segmenting syllables in PA instruction and assessment.

Phonemes

Phonemes refer to the small units of sounds (Goswami & Bryant, 2016). Phonemic awareness specifies the identification and manipulation of phonemes and the children's ability to read augments the phonemic awareness skills of manipulation (Goswami & Bryant, 2016; Ziegler & Goswami, 2005). Children under 4 years of age typically experience difficulty with phoneme final deletion tasks in contrast to increased success for children ages 5 to 7 years old (Bruce, 1964; Fox & Routh, 1975). Particularly, children ages 5 and 6 years scored higher in final phoneme deletion tasks as opposed to initial phoneme deletion tasks in one syllable words (Content et al., 1986; Rosner and Simon, 1971). Children tend to remember the last phonemes more readily than the more difficult cognitive task of holding the initial sound in memory while performing additional cognitive tasks. The research affirms Piaget's (1936/1952) assertion of

young pre-operational children not being developmentally ready for advanced cognitive tasks, such as initial deletion of phoneme.

Alliteration and Rhyming

Alliteration refers to words that begin with the same sound and children's awareness of the beginning sounds of words is essential in alliteration tasks. Rhyming consists of words sharing the same spelling pattern and children's awareness of ending sounds is crucial in rhyming tasks. Research from rhyming and alliteration concluded that Pre-K children scored above chance level in oddity tasks (Goswami & Bryant, 2016). Oddity tasks involve the identification of the word that does not rhyme or begin with the same sound from a group of three words. The findings showed that the children were not guessing, and an understanding of rhyming and alliteration was developing. In addition, direct instruction and invented play experiences demonstrated increased learning in alliteration and rhyming (Cavanaugh et al., 2017; Roskos & Christie, 2013). Specifically, direct instruction in rhyming and alliteration augmented the children's knowledge of letter sound correspondence (Cardoso-Martins et al., 2011). Through direct instruction, teachers emphasized the ending letter sounds to advance rhyming, and the beginning letter sounds to teach alliteration. Bruner (1960) supported direct instruction of children constructing their learning through a coding system of the teacher facilitating and scaffolding the learning process (Metsämuuronen & Räsänen, 2018; Olson, 2007). Children engaged in invented play experiences with peers to extend their language skills and increase their alliteration and rhyming skills. Piaget's (1964/1967) emphasized that children construct learning through the interaction with the environment and peer to peer (Wadsworth, 2004).

Phonological mnemonic triggers of rhyme, rhythms, and music aid the cognitive processes of storing and retrieving information (Metsämuuronen & Räsänen, 2018).

Experimental research by Wallace (1994) found an increase of memory when text was perceived as a song as opposed to speech. Music and rhythm assist children in learning by evoking a playful experience as children learn best through play. Bruner (1966) focused on cognitive linguistic, narrative, and logico-scientific triggers but was disinterested in the phonological mnemonic triggers (Metsämuuronen & Räsänen, 2018). The findings reveal an association between phonological mnemonic triggers and cognitive processes that Bruner did not explore.

Instructional Support

Instructional support classroom interactions augment cognitive and language development and advance children's vocabulary and PA skills. CLASS, an observation evaluation tool, assesses the quality of classroom interactions in the domains of emotional support, classroom organization, and instructional support (Pianta et al., 2008). This research study utilizes the CLASS instructional support domain and its' dimensions of concept development, quality of feedback, and language modeling. These three CLASS dimensions within the instructional support domain will provide detailed descriptions for this study related to all classroom interactions associated with instructional support (Pianta et al., 2008).

Research on CLASS instructional support positively influenced the outcomes of academic and language skills in prekindergarten (Burchinal et al., 2010; Mashburn et al., 2008). These researchers obtained their samples from the same secondary data studies and measured their samples' academic and language skills consisting of vocabulary, letter names, sound awareness, rhyming, mathematics, problem solving, receptive language, and expressive language skills (Burchinal et al., 2010; Mashburn et al., 2008). Mashburn et al. (2008) observed 2,439 4-year-old children enrolled in 671 Pre-K classrooms from 11 states, and Burchinal et al. (2010) included only low-income 4-year-old children and formed a sample size of 1,129 from the 671

Pre-K classrooms in the 11 states. Specifically, Mashburn et al. (2008) found that mid- to high-quality instructional support was positively associated with the academic and language skills, and Burchinal et al. (2010) found that instructional support scores of mid- to high-quality produced increased scores in the academic and language skills. Moreover, in a sample size of 304 children ranging from ages 3 to 5 years in an urban Head Start program, higher levels of instructional support yielded increased scores in language and literacy (Bulotsky-Shearer et al., 2020).

Pre-K effective instructional support interactions impact consequent scholastic success (Ansari & Pianta, 2018; Carr et al., 2019; Vernon-Feagans et al., 2019). Mid- to high-quality classroom interactions as measured by CLASS in Pre-K predict future academic achievement (Ansari & Pianta, 2018; Carr et al., 2019). Moreover, Carr et al. (2019) concluded that high-quality Pre-K instructional support yielded increased kindergarten language and literacy skills. Longitudinal research from Pianta and Ansari (2018) on secondary data measured over 1,300 children in Pre-K, first grade, third grade, and fifth grade using the Observational Record of the Caregiving Environment (ORCE), the predecessor to the CLASS assessment. The findings showed that effective instruction in Pre-K provides the foundation for future scholastic achievement. Subsequent academic success extended through fifth grade for children who were continuously exposed to mid- and high-classroom interactions from Pre-K through fifth grade (Ansari & Pianta, 2018). The results highlight the importance of continuous of mid- to high-quality classroom interactions throughout the elementary school years. Moreover, the continued yearly exposure to high-quality classroom interactions promoted increased literacy scores for students with low-literacy skills upon school entry (Vernon-Feagans et al., 2019). According to the findings from Vernon-Feagans et al. (2019), high-quality classroom interactions provide

effective literacy learning to struggling students. It is essential that all children experience mid- to high-quality interactions that advance learning and development appropriate to Pre-K children to set the foundation for subsequent academic success. Research of the dimensions of concept development, quality of feedback, and language modeling in the instructional support domain will be examined.

Concept Development

Concept development is a dimension in the domain of instructional support. As measured by CLASS, concept development includes interactions that connect children's learning to real world applications, prior knowledge, brainstorming, and higher-order questioning of analysis and reasoning (Pianta et al., 2008). Research to support the implementation of analysis and reasoning demonstrates that Pre-K children employ critical thinking with appropriate developmental and instructional practices (Bruner, 1978; Copple & Bredekamp, 2013). Findings show that Pre-K teachers who engage in asking critical thinking questions of analysis and reasoning score at the mid- or high-quality in concept development in contrast to teachers that do not employ the skills (Curby et al., 2009). Analysis and reasoning interactions consist of asking questions of why, how, comparing, contrasting, evaluating, classifying, and creating to promote critical thinking skills.

Moreover, Pre-K children showed gains in literacy skills with higher scores in concept development classroom interactions (Curby et al., 2009; Goble et al., 2019). Concept development interactions enable the critical thinking skills of analysis and reasoning, brainstorming, planning, integrating concepts, and connecting concepts to real world experiences. Research on outdoor play revealed that when children spent more time outdoors during instructional activities, the concept development scores also increased because of

experiences in problem resolutions and experiments of analysis and reasoning, and connections to real world opportunities (Tonge et al., 2019). The gains in concept development may be attributed to the increased experiences in real world applications during instructional activities outdoors.

Quality of Feedback

Quality of feedback is the second dimension in the domain of instructional support that this research study utilized from the CLASS. The cognitive dimension of quality of feedback accounts for the elevated understanding and participation of the teacher's interaction to the child's utterances or actions (Pianta et al., 2008). As evaluated by CLASS, quality of feedback consists of scaffolding, feedback loops, prompting thought processes, providing information, encouragement, and affirmation (Pianta et al., 2008). Teachers scaffold by employing hints and assistance to permit the child to function at an elevated level rather than performing the task independently at a lower level (Bruner, 1978). Research on the relevance of the ZPD stated that the increased instructional assistance a child secured from the teacher correlated to increased capacity for the children to solve and succeed with the task (Solovieva & Quintanar, 2016). Early childhood educators scaffold by modeling and providing assistance to the child for completing the task. The children reacted favorably to the scaffolding and requested increased difficulty yielding an increase in inhibitory control (Solovieva & Quintanar, 2016). The teacher's assistance resulted in the children experiencing no frustration and an increase in inhibitory control.

Interactions that employed higher-order thinking skills and questioning prompted back-and-forth feedback loops to obtain increased knowledge and levels of quality of feedback (Downer et al., 2010; Miri et al., 2007). Moreover, the increased levels of quality of feedback

showed greater inhibitory control of attention, memory, and executive functioning in Pre-K children (Goble et al., 2019; Solovieva & Quintanar, 2016). Children engaging in back-and-forth exchanges through the analysis and reasoning questions encourage critical thinking and higher brain activity. Interactions that prompt thought processes advance metacognition, the awareness of self-thought processes. Evidence depicted young children ages 3 to 5 years processed metacognition in appropriate developmental related contexts (Marulis et al., 2016; Shamir et al., 2009). The findings support Bruner's view that all children can learn when concepts are presented at their appropriate level. Pre-K children employ metacognition in the daily interactions such as interactive read alouds, small and large group instruction, collaborating with peers in centers, and conversations during mealtimes. Examples include asking children to explain their thought or action process.

Feedback is essential in providing information, encouraging, affirming, recognizing, and reinforcing children's efforts to augment learning and participation (Pianta et al., 2008). Teachers provide information by elaborating, clarifying, and providing specific feedback. The information enables the children to know the effective specific components of the task. Dweck's (2007) findings showed that praising children for effort and hard work advanced a growth mindset that afforded the children success in challenging tasks. Research from Dweck (2007) concluded that fifth grade and kindergarten children praised based on intelligence cultivated a fixed mindset and showed an increased likelihood to surrender the difficult tasks due to fear of failure. In contrast, children who were praised for effort and hard work developed a growth mindset that enabled the children to succeed when tasks got difficult. (Dweck, 2007). Providing children with positive specific feedback advanced the children's increased understanding and

effort with challenging tasks (Dweck, 2007). Positive specific feedback empowers children to increase children's understanding and efforts.

Language Modeling

Language Modeling consists of language facilitation techniques of the indicators of back-and-forth conversations, open-ended questions, repetition and extension, self and parallel talk, and advanced language of using vocabulary (Pianta et al., 2008). Clay (2014) concluded that young children naturally acquire language through conversations with caregivers that apply language techniques that attune to the children's utterances. Play research showed that children's language skills increased when they imitate adult roles in their play (Copple & Bredekamp, 2013; Rajapaksha, 2016). The level of teacher-child interactions impacted the children's conversation response and initiation (Rajapaksha, 2016). Children engage in conversations during pretend play and augment their speaking, listening, and vocabulary skills. Teachers increase the children's language level during pretend play by joining the activity, asking open-ended questions, and providing time for the children to respond with own ideas and words. Moreover, the asking of open-ended questions increased the children's inquiry stance and the amount of words they used during conversations (Miri et al., 2007). The open-ended questions enabled children to respond using multiple words and think critically.

Teachers employed repetition and extension of the children's utterances to promote the pragmatic, syntactic, and semantic processes (Johnston, 2004; Pianta et al, 2008). An example of repetition and extension consist of a child showing and saying truck. The teacher repeats and extends by responding with "I see you have a large red fire truck." Teachers advance the pragmatic system by providing additional information. The teacher's extension advances the syntactic process of responding in complete sentence with verb and adjectives. The use of

classifying truck as a fire truck augments the semantic system. Findings from Pence et al. (2008) showed that recasting of repeating the children's utterances and extending with varied syntax was the most common and straightforward method for teachers to implement with the children as compared to the other language stimulation techniques.

Another language facilitation technique that develops children's language skills include the indicators of self and parallel talk. Self-talk describes the speaker vocalizing their own actions, and parallel talk involves the speaker vocalizing another's actions (Pianta et al., 2008). An example of self-talk consists of the teacher picking up an eraser and saying, "I am picking up the eraser." Parallel talk refers to the teacher saying, "Joey is talking to the puppet," as Joey talks to the puppet. Dickinson and Porche (2011) found that teachers' language modeling and use of advanced vocabulary during free play in an early learning classroom was directly correlated with literacy and learning in fourth grade. Instruction during the early years set the foundation for subsequent learning.

Summary

The literature review examined and analyzed the theoretical models of Piaget's theory of cognitive development and Bruner's mental modes of representation. The concepts of Piaget's preoperational thought stage and Bruner's LASS and instructional concepts of scaffolding and spiral curriculum were synthesized with the instructional support interactions of concept development, quality of feedback, and language modeling, and the literacy skills of vocabulary and phonological awareness. The review of the literature showed the projected relationship of the empirical research study that will be discussed in Chapter 3.

CHAPTER III

METHODOLOGY

This research study examined vocabulary and PA learning across time at the beginning, middle, and end of a Pre-K year in an ISD. In addition, the study investigated classroom interactions associated with literacy learning in the fall and spring of Pre-K using classroom observational data gathered and recorded by the ISD. This chapter explains the research design, sample population, sampling method, inclusion and exclusion criteria, protection for participants, procedures, instruments, data collection, and analysis plan.

Research Design

The research study employed a quantitative design analyzing secondary data collected over the time of 1 year to answer the research questions. The rationale for selecting a quantitative design included the identification of the variables of vocabulary, PA, and instructional support in the research questions, the analyzation of numerical secondary data, and application of statistical procedures of SEM. Specifically, Piaget's construct of combinatorial reasoning was employed to guide the methodology. Combinatorial reasoning refers to rationally thinking about several variables simultaneously to construct a relationship between the variables and validate the relationship through systematic experiments (Wadsworth, 2004). The specification of the model and research questions exemplified the logic for the inclusion and relationship of the eight variables in the study. The relationships of the variables were investigated through a systematic analysis plan. Reflective abstraction was evident in the results and discussion of the study by analysis and the results of data to construct new knowledge (Wadsworth, 2004).

Sample Population

The study population consisted of secondary data from 2021-2022 school term of Pre-K classrooms from an ISD in Texas. The ISD offered at least one Pre-K classroom in over 75 elementary schools. The Pre-K population of the school year of 2021-2022 in the ISD consisted of approximately 10,000 students and accounted for 7% of the ISD population (TEA, 2022). The approximate ethnicity demographic information included 65% Hispanic, 26% Black, 5% White, 2% Asian, and 2% other (TEA, 2022). The ISD provided Spanish vocabulary and PA instruction to approximately 5,000 Pre-K students and approximately 200 students received English as a Second language (ESL) instruction (TEA, 2022). Approximately 92% of the Pre-K children were economically disadvantaged (TEA, 2022). To qualify for free enrollment, children must be 3 or 4 years old before the 1st of September and conform to one of the subsequent requirements: free/reduced meals established on income, homeless, foster care, military parent, or parent is Star of Texas award recipient as peace officer, fire fighter, or medical first responder (ISD, 2020). The ISD also offered tuition-based Pre-K at selected schools for children who do not qualify for free enrollment. Space availability was granted first to children who qualified for free enrollment.

The study sample consisted of 325 Pre-K classrooms, including 160 bilingual Spanish classrooms and 165 general education or English-speaking classrooms. Pre-K vocabulary and PA instruction in the sample accounted for 49% in Spanish and 51% in English. Children were placed in Spanish classrooms based on the parents request or the parents indicating that Spanish is the home language on the Pre-K admission forms. In addition, children who received instruction in English may have spoken a home language that was not English. Texas required all teachers to obtain a certificate in ESL to support the children's English language development.

Each classroom included one teacher and one teaching assistant. The teacher qualifications also consisted of a Texas teaching certificate in EC-4th grade or EC-6th grade, and minimum of a bachelor's degree. The teacher assistance position required completion of a high school degree. The Pre-K classrooms in the sample included children 4 to 5 years of age. The ISD Pre-K classroom size ranged from nine to 27 children which depended on student enrollment.

Sampling Method

A purposive sampling method was utilized due to the researcher's employment with one of the schools in the ISD. The ISD supports employee graduate research. The sample consisted of 2021-2022 secondary data from approximately 325 classrooms of children ages 4 to 5 years enrolled in Pre-K in the ISD. The classrooms were identified by the presence of classroom on-track benchmark scores of vocabulary, and the PA skills of syllabication, alliteration, rhyming, and letter sounds at the beginning, middle and end of the year from the instrument CIRCLE CLI Engage (Landry et al., 2014) in the data. In addition, the classrooms were also identified with the presence of fall and spring scores in instructional support, concept development, quality of feedback, and language modeling from the instrument CLASS (Pianta et al., 2008) in the data. Multi-age Pre-K classrooms and exceptional education classes were excluded from the study.

The secondary data did not include identifiable information of teacher and school names. The data identified the classrooms as 1-325. Each numbered classroom contained the scores of vocabulary, syllabication, onset rime, alliteration, rhyming, letter sounds, instructional support, concept development, quality of feedback, and language modeling. The presence of onset rime was utilized to identify the English classrooms, and the absence of onset rime identified the Spanish classrooms. In the CIRCLE CLI Engage, the English PA assessment included onset rime and the Spanish PA did not include onset rime. Onset rime was not analyzed in the study.

Vocabulary, the PA sub skills of syllabication, letter-sound correspondence, rhyming, and alliteration, instructional support, concept development, quality of feedback, and language modeling were analyzed in the study.

The students' data of vocabulary and PA were collected at BOY, MOY, and EOY of the school year using the CIRCLE CLI Engage. The teachers rendered the online evaluations of vocabulary and PA individually to the children in Spanish or English according to the classroom language of instruction. As the children finished each assessment, the responses were recorded, and the scores were automatically displayed by the children's names on the online CLI Engage dashboard. The reports tab in the dashboard included the classroom on-track benchmark scores of Vocabulary and PA skills that were analyzed in the study. The teachers provided additional instruction to the children that did not meet the on-track benchmark scores. The Spanish and English Vocabulary and PA subskills of syllabication, rhyming, alliteration, and letter sounds utilize the same subscales and procedures.

A private university in Texas conducted the CLASS observation assessments (Pianta et al., 2008) for the classroom interactions in the fall of 2021 and spring of 2022 and disclosed the CLASS scores to the ISD. The university employed the certified CLASS observers who completed a rigorous 2-day CLASS training, passed the certification reliability test, and retested yearly to renew certification for coding reliable observations (Pianta et al., 2008). The certified CLASS observers assessed Spanish and English Pre-K classroom interactions between teachers and children and children and their peers during mealtimes, center activities, large group, and small group activities. During the classroom observations, the CLASS observers took meticulous notes on four cycles of 20-minute observations and allocated scores to the CLASS dimensions and domains. The CLASS employed the same rating scale to the Spanish and English

classrooms. The CLASS domains included interactions of emotional support, classroom organization, and instructional support. Each domain consisted of dimensions that captured the quality of interactions in the specific domain. The scores were issued to the teachers, principal, and instructional coaches in the schools. In partnership, the teachers and instructional coaches utilized developmentally appropriate practices and the CLASS tool to set goals to advance effective classroom interactions. The CLASS scores were not applied as an evaluation but as a professional development tool. The domain of instructional support and its dimensions of concept development, quality of feedback, and language modeling will be analyzed in the study.

Inclusion Criteria

The ISD Pre-K classrooms that instruct vocabulary and PA instruction in Spanish and English were an inclusion criteria. The classroom on-track benchmark scores of vocabulary, and the PA skills of syllabication, alliteration, rhyming, and letter sounds at the beginning, middle and end of the year of the instrument CIRCLE CLI Engage (Landry et al., 2014) were included in the study. Pre-K classrooms that are assessed the fall and spring CLASS Observations (Pianta et al., 2008) were included in the study. The number of Pre-K classrooms included in the study was 325.

Exclusion Criteria

The exclusion criteria included the children's age and the ability to complete the CIRCLE CLI Engage (Landry et al., 2014). Mixed-aged classrooms such as Head Start classrooms, with children younger than 4 years of age at the commencement of the study were not eligible. The ISD did not assess the PA skills in classrooms for children younger than 3 years old. Young children may not be developmentally ready to begin PA instruction before 4 years of age. Therefore, Pre-K classrooms serving children who are 3 years of age at the commencement of

the 2021-2022 school year were excluded in the study. Montessori classrooms were also excluded from the study due to the children's mixed age-groups and the use of a different curriculum from the ISD Pre-K classrooms. In addition, exceptional education Pre-K classrooms that contain children who are not able to complete the CIRCLE CLI Engage (Landry et al., 2014) assessment due to developmental reasons were excluded from the study. The children were not assessed the skills if they were not able to remain physically in the area or cognitively able to focus or verbalize the responses in the three time points. Another exclusion criteria consisted of omitting the researcher's school of employment to comply with ISD policy.

Power Analysis

After using the SEM specification process, the next step was identification of determining the sample size (Kline, 2006). The sample size was identified following the *N:q* rule. The identification of a model assesses if a structural equation model is theoretically able to generate a specialized set of model parameter estimates (Kline, 2016). The model established 24 parameters, which yielded a sample size recommendation of 480 participants based on the *N:q* ratio of 20:1. The recommended minimum sample size based on the ratio of 10:1 yielded $N = 240$. The adequate sample size of 325 fell between the minimum and maximum number of participants and provided the statistical power to answer the research questions.

Protection of Human Participants

The Texas Woman's University Institutional Review Board (IRB) and the ISD Research Review Board [RRB] provided approvals to conduct the research (see Appendix A). In addition, the researcher signed a data sharing agreement with the ISD to adhere to district policies and maintain confidentiality The researcher received the secondary data unidentifiable to ensure anonymity to teachers and students.

Description of Instruments

The CIRCLE CLI Engage (Landry et al., 2014) accurately assessed the literacy skills of vocabulary and PA in Spanish and English for Pre-K children. The CLASS (Pianta et al., 2008) precisely measured the quality of Pre-K Spanish and English classroom interactions in instructional support. CLASS (Ansari & Pianta, 2018; Bulotsky-Shearer et al., 2020; Burchinal et al., 2010) and CIRCLE CLI Engage (Brown, 2013; Crawford et al., 2017; Landry et al., 2014) are reliable and validated instruments that have been utilized in various studies. The CIRCLE CLI Engage was employed to measure research questions 1-4, and the CLASS assessment was utilized to measure research question 5. Both CIRCLE CLI Engage, and the CLASS assessment were applied to measure research question 6.

CIRCLE Children's Learning Institute Engage Assessment

The CIRCLE CLI Engage, a standardized, progress-monitoring tool, assesses children 4 to 5 years of age vocabulary and PA skills (Landry et al., 2014). The classroom teachers conducted the vocabulary and PA assessments individually to each child amid a 3-week period at BOY during the month of September, MOY during the end of January and beginning of February, and EOY during the month of May. The teachers assessed the online English or Spanish version of the CIRCLE CLI Engage based on the language of instruction in vocabulary and phonological awareness. As the children finished each assessment, the responses were recorded, and the scores were automatically displayed by the children's names on the online CLI Engage dashboard. CIRCLE CLI Engage employed the sum method to add the scores of syllabication, alliteration, rhyming, and letter sounds to create a PA composite variable. The reports tab in the dashboard included the classroom on-track benchmark scores of Vocabulary and PA and the subskills of syllabication, alliteration, rhyming, and letter sounds. The on-track

classroom benchmark scores generated by CIRCLE CLI Engage used the mean method. The classroom average scores utilized in the study represented the percentage of children that met the benchmark scores.

Vocabulary Knowledge

The CIRCLE CLI Engage assessment was used to measure the student's vocabulary knowledge. Vocabulary knowledge was a 1 minute timed assessment that included 55-items for both English and Spanish. The teacher displayed illustrations of objects and actions, and the student articulated the word according to the language of vocabulary instruction of Spanish or English. The teacher coded the student's response as 0 for incorrect and 1 for correct. The student's score reflected the number of words identified correctly in 1 minute. For example, a picture of a ball appeared on the screen and the teacher asked, "What is the name of this picture?" The child named the picture.

Phonological Awareness Knowledge

PA encompassed the subskills of syllabication, alliteration, rhyming and letter sounds. The sum method of adding together the scores of the subskills generated the 35-point maximal score for the PA composite variable. The teacher individually administered the Spanish or English online assessments according to the PA language of instruction by asking the specified PA questions to the child and coding the child's responses as 0 for incorrect and 1 correct. The PA assessment took approximately 15-20 minutes to administer.

Syllabication. The Spanish and English 7-item subskills of syllabication consisted of a student clapping one to three syllable words. The child's responses were coded 0 for incorrect answers and 1 for correct answers. An example in English included the teacher asking, "Clap the parts you hear in the word cowboy." The child clapped the syllables for the word cowboy.

Alliteration. Alliteration included 7-items in which the teacher asked the student in Spanish or English if two words began with the same sounds, and the students responded yes or no in the language of instruction. The child's responses were coded 0 for incorrect answers and 1 for correct answers. An example of an English question included, "Say the words silly, sun." The child repeated the words, and the teacher asked, "Do the words silly, sun begin with the same sound?" The child responded yes or no.

Rhyming. In the Spanish or English 9-item subscale of rhyming, the students identified if two words rhyme by answering yes or no in the language of instruction. The child's responses were coded 0 for incorrect answers and 1 for correct answers. An example of an English question included, "Say the words cat, mat." The child repeated the words, and the teacher asked, "Do the words cat mat rhyme?" The child responded yes or no.

Letter Sounds. In the Spanish or English 12-point scale letter sounds assessment, the teacher asked the child to make the sound of the letter shown on the screen. The student vocalized the letter sound in the language of instruction. The child's responses were coded 0 for incorrect answers and 1 for correct answers. For example, the uppercase letter F appeared on the screen and the teacher asked, "What sound does this letter make?" The child produced the sound of the letter.

Reliability and Validity

CIRCLE CLI Engage report's reliability data was based on plentiful studies conducted by CLI in conjunction with agencies such as TEA and Texas Early Education Model (TEEM; Landry et al., 2014). Reliability data included internal consistency $\alpha = .91$ for PA and interclass correlation coefficients of .66 for vocabulary and PA (Landry et al., 2014). Test-Retest correlation coefficients consisted of Vocabulary BOY and MOY = 0.68, MOY and EOY = 0.68,

and BOY and EOY = 0.59. Test-Retest correlation coefficients for phonological awareness assessment included BOY and MOY = 0.68, MOY and EOY = 0.75, and BOY and EOY = 0.58.

A reliability test for vocabulary knowledge was not conducted due to lack of subskills. The researcher performed reliability tests on the sample to assess the internal consistency of the skill items of syllabication, alliteration, rhyming, and letter sounds representing similar attributes for PA. IBM SPSS Statistics Version 25 removed letter sounds BOY from the scale of PA at BOY due to zero variance. Letter sounds MOY and EOY were included in the scales of PA MOY and EOY, respectively. The reliability tests revealed BOY $\alpha = .67$, MOY $\alpha = .68$, and EOY $\alpha = .74$. Reliability estimates did not increase substantially to warrant deleting letter sound correspondence to the PA variable in MOY and EOY.

Convergent validity established the following correlations by comparing similar assessments. The CIRCLE CLI Engage vocabulary assessment moderately correlated with the Expressive One Word Picture Vocabulary Test (EOWPVT) of fall = 0.59 and spring = 0.45. The CIRCLE CLI Engage PA assessment showed low correlations with Developing Skills Checklist (DSC) of fall = 0.39 and spring = 0.37. The CIRCLE CLI Engage and the DSC are not similar assessments due to low correlations.

Classroom Observation Scoring System

CLASS, an observation evaluation tool, assesses the quality of classroom interactions (Pianta et al., 2008). CLASS evaluates the quality of teacher and children, teacher assistant and children, and child to child interactions in the domains of emotional support, classroom organization, and instructional support (Pianta et al., 2008). The domains consist of various dimensions that refer to a specific facet of the classroom interactions. The domain of instructional support and its dimensions of concept development, quality of feedback, and

language modeling were analyzed in the study. The observations for the variables were conducted each fall and spring by the local university's certified observers from September to November and March to May. The class tool utilized the same procedures and scales to assess Spanish and English classrooms. Spanish bilingual observers assessed Spanish classrooms and English-speaking observers assessed classrooms with instruction in English. The local university granted the teachers a 10-day assessment period in which the observations are conducted by a certified CLASS observer at an unspecified time throughout the school day excluding naptime and recess.

Domain: Instructional Support

CLASS was utilized to measure the domain of instructional support, which involved teaching interactions that advances the children's cognition and language skills. Instructional support encompassed the dimensions of concept development, quality of feedback, and language modeling. As stated above, the certified CLASS observers from the local university observed classroom interactions for instructional support in the fall and spring. The observers took precise notes in Spanish or English on classroom interactions according to the language of instruction that corresponded to the dimensions. The dimensions included indicators that define the interactions as low-, mid-, or high-quality (see Table 1).

Table 1

Instructional Support Quality Descriptions

Indicators	Low-Quality Descriptions (Score of 1, 2)	Mid-Quality Descriptions (Score of 3-5)	High-Quality Descriptions (Score of 6, 7)
	Concept Development		
Analysis and Reasoning Creating Integration Connections to Real World	Rarely connects children's learning to real world applications, prior knowledge, higher-order questioning, and brainstorming.	Sometimes connects children's learning to real world applications, prior knowledge, higher-order questioning, and brainstorming.	Frequently connects children's learning to real world applications, prior knowledge, higher-order questioning, and brainstorming.
	Quality of Feedback		
Scaffolding Feedback Loops Prompt Thought Processes Provide Information Encourage and Affirm	Rarely expands the children's cognitive responses and participation through learning opportunities of scaffolding, asking follow-up questions, and providing information, encouragement and affirmations.	Sometimes expands the children's cognitive responses and participation through learning opportunities of scaffolding, asking follow-up questions, and providing information, encouragement and affirmations.	Frequently expands the children's cognitive responses and participation through learning opportunities of scaffolding, asking follow-up questions, and providing information, encouragement and affirmations.

Indicators	Low-Quality Descriptions (Score of 1, 2)	Mid-Quality Descriptions (Score of 3-5)	High-Quality Descriptions (Score of 6, 7)
		Language Modeling	
Frequent Conversations Open-Ended Questions Repetition and Extension Self and Parallel Talk Advanced Language	Rarely encourages the teacher's use of language stimulation techniques of engaging in conversations, repeating and extending the children's responses, mapping actions with words, and utilizing advance vocabulary.	Sometimes encourages the teacher's use of language stimulation techniques of engaging in conversations, repeating and extending the children's responses, mapping actions with words, and utilizing advance vocabulary.	Frequently encourages the teacher's use of language stimulation techniques of engaging in conversations, repeating and extending the children's responses, mapping actions with words, and utilizing advance vocabulary.

Note. The instructional support domain consists of the dimensions of concept development, quality of feedback, and language modeling that focus on distinct aspects of teacher-child and peer to peer interactions. The presence or absence of the indicators define the quality levels of low, mid, or high for each of the dimensions. The descriptions specify low-, mid-, and high-quality classroom interactions for each dimension (Pianta et al., 2008).

Based on the absence or presence of the indicators, the CLASS observers rated the classroom interactions in concept development, quality of feedback, and language modeling as low-, mid-, or high-quality. According to the assigned ratings of the categories of low-, mid-, or high-quality, the CLASS instrument calculated the dimension scores using the 7-point Likert scale for concept development, quality of feedback, and language modeling and an overall score for the domain of instructional support. CLASS categorized and recorded the scores numerically as low- (scores of 1 and 2), mid- (scores of 3 - 5), and high- (scores of 6 and 7) quality classroom interactions to report the results in a standardized format (Pianta et al., 2008). CLASS applied the mean method for the dimensions of concept development, quality of feedback, and language modeling to produce the composite variable of instructional support. The English and Spanish instructional support variables were utilized to test differences between fall and spring for research question 5. The variable for instructional support was also tested to moderate the relationship from BOY and EOY vocabulary and phonological awareness in research question 6. The indicators and examples of low-, mid-, or high-quality classroom interactions are included next for the dimensions of concept development, quality of feedback, and language modeling.

Concept Development. CLASS observers observed and rated the absence or presence of the concept development indicators as low-, mid-, or high-quality utilizing the 7-point Likert scale by teachers implementing critical thinking questions, integrating new and prior learning, and linking new knowledge with real world examples. An example of mid-quality rating for the indicator of integrating new and prior knowledge included, the teacher sometimes provided opportunities to link concepts and activities to previous learning and to the children's lives. During the greeting circle and small groups, the teacher connected the activities to the read aloud

concepts. However, during centers, the teacher missed opportunities to connect concepts to prior knowledge or activities.

Quality of Feedback. CLASS observers noted and rated the absence or presence of the quality of feedback indicators as low-, mid-, or high-quality using the 7-point Likert scale of teachers employing back and forth feedback loops, eliciting thought processes, supplying knowledge, and confirming participation and learning. An example of low-quality rating for the indicator of providing information included, the teacher providing limited information to expand, clarify, and provide specific feedback to advance student learning. The teacher expanded information on serving the pretend hot food using a utensil and plate. On another occasion, the teacher said, "Carrots have vitamins that help us stay healthy." Although the teacher provided limited information, clarification, and specific feedback it did not happen frequently, and limited information lacked depth.

Language Modeling. CLASS observers viewed and rated the absence or presence of the language modeling indicators of low-, mid-, or high-quality on the 7-point Likert scale by teachers implementing terminology, student talk, and repetition and expansion of the children's utterances and actions. An example of high-quality rating for the indicator of repetition and expansion included, the teacher often repeating or extending the children's responses. During the lesson of fishing for numbers and letters, the teacher repeated the numbers and letters that the children caught. While participating in conversations with the children, the teacher also repeated the children's responses such as the colors they used in their drawings. The teacher extended the children's one-word responses by including the word in a complete sentence. An example of extension with the word "red" was "Your fish is red."

Reliability and Validity

CLASS reliability and validity data stemmed from MyTeachingPartnerStudy (MTP; Pianta et al., 2008). Reliability reports included internal consistency reliability of the domain of instructional support (α = .86), the dimensions of concept development (α = .83), and quality of feedback (α = .84). The interrater reliabilities consisted of .85 for concept development, quality of feedback, and language modeling. The researcher performed reliability tests on the sample to assess the internal consistency of instructional support fall α = .90 and spring α = .88 for the dimensions of concept development, quality of feedback, and language modeling representing similar attributes.

Convergent validity showed that CLASS was moderately associated empirically with the Early Childhood Environment Rating Scale- Revised (ECERS-R; Harms et al., 2004). The ECERS-R is a reputable instrument utilized in multiple studies over a span of years with good reliability and validity measures (Harms et al., 2004). Criterion validity coefficients for the CLASS domains and the ECERS-R showed significant correlation (r = .45, p < .001) of Instructional Support.

Data Collection

The researcher received the unidentified data with the classrooms numbered from 1-365 from the ISD. The CLI Engage on-track classroom benchmark vocabulary and phonological awareness scores for BOY, MOY, and EOY were entered into SPSS next to the corresponding number assigned to the Pre-K classroom. The presence of onset rime score was coded as 1 to signify English classrooms and the absence of onset rime scores was coded as 0 to signify Spanish classrooms. The CLASS domain instructional support classroom scores and the dimensions of concept development, quality of feedback, and language modeling were inputted

into SPSS next to the corresponding number assigned to the Pre-K classroom. The variables of vocabulary, phonological awareness, syllabication, alliteration, rhyming, phonemes, instructional support, concept development, quality of feedback, and language modeling were numerical continuous variables. The variables and scores for each classroom were recorded in a notebook next to the assigned classroom number to store the data in an alternate location for safety. The notebook was kept in a locked cabinet in the researcher's locked home office. The notebook contained numbers 1-325 and the corresponding classroom data. The information in the notebook couldn't be traced to the children or teachers if anyone should ever see it. There were no identifiable names only numeric values in the notebook and SPSS. The SPSS file was converted to a dat file to be read in Mplus, and which contained no identifiable names.

Analysis Plan

Once the data was inputted into SPSS, the process of data preparation commenced. The data was examined for errors and outliers of values veering away from within the range of most of the values. Errors may have included missing values miscoded and assigning values of -99 helped signal missingness. It was important to examine outliers as within the range of possible scores that a child would have earned by looking at the maximum points allotted to the variable in the measure. Using SPSS, a composite variable for on-track benchmark classroom scores for phonological awareness was created using the mean method with the variables of syllabication, alliteration, rhyming, and phonemes. The composite variable of instructional support supplied from CLASS was verified using the mean method. Reliability tests for the variables of instructional support and phonological awareness were conducted to evaluate the internal consistency of the skill items representing similar attributes, and the Cronbach's alpha was reported. The moderator of spring instructional support variable and the BOY vocabulary and

phonological awareness variables were converted into standardized *z*-scores in SPSS to answer research question 6.

The preliminary analysis was conducted to report descriptive statistics and assess the assumptions of parametric statistics using IBM SPSS Statistics Version 25. The descriptive statistics results of mean, standard deviation, ranges, variance, skewness, and kurtosis for the study variables were reported. Lastly, the SPSS file was converted to a data file to be read in Mplus.

Using the statistical program Mplus version 8.6, an SEM of cross-lag autoregressive and moderation analyses were conducted to investigate the associations of the variables in the research questions of the study. The autoregressive analysis investigated the stability of the variable of vocabulary across time points of BOY, MOY, and EOY and phonological awareness variable across time of BOY, MOY, and EOY to answer research questions 1-4. The cross-lag evaluated causal relationships and aided with the bidirectional impact of the variables by testing the stability of two variables collected at different time points, such as vocabulary BOY and phonological awareness MOY in research questions 1-4. Regression analysis was performed to test the CLASS instructional support from fall associated with spring classroom scores for research question 5. The moderation analysis allowed to test instructional support impacting the relationship from BOY and EOY scores of vocabulary and phonological awareness to answer research question 6. The model fit indices, unstandardized beta coefficients, standard error and *p*-values were reported. Table 2 identifies the research questions, variables, instruments, statistics, and displays employed to answer each question.

Table 2

Plans for Data Analyses

Research Questions	Variables	Instruments	Statistics	Displays
1. Are on-track BOY benchmark classroom scores of Vocabulary associated with MOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-K?	BOY Vocabulary, MOY Vocabulary, MOY Phonological Awareness	CIRCLE CLI Engage	Means, SD, Cross-lag Autoregressive, Chi-square Difference Tests	Table and figure for Unstandardized Coefficients
2. Are on-track BOY benchmark classroom scores of Phonological Awareness associated with MOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-K?	BOY Phonological Awareness, MOY Vocabulary, MOY Phonological Awareness	CIRCLE CLI Engage	Means, SD, Cross-lag Autoregressive, Chi-square Difference Tests	Table and figure for Unstandardized Coefficients
3. Are on-track MOY benchmark classroom scores of Vocabulary associated with EOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-K?	MOY Vocabulary, EOY Vocabulary, EOY Phonological Awareness	CIRCLE CLI Engage	Means, SD, Cross-lag Autoregressive Chi-square Difference Tests	Table and figure for Unstandardized Coefficients
4. Are on-track MOY benchmark classroom scores of Phonological Awareness associated with EOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-K?	MOY Phonological Awareness, EOY Vocabulary, EOY Phonological Awareness	CIRCLE CLI Engage	Means, SD, Cross-lag Autoregressive Chi-square Difference Tests	Table and figure for Unstandardized Coefficients

Research Questions	Variables	Instruments	Statistics	Displays
5. Are Pre-K CLASS instructional support from fall associated with spring classroom scores?	Fall Instructional Support, Spring Instructional Support	Classroom Assessment Scoring System	Means, SD, Regression Analysis	Table and figure for Unstandardized Coefficient
6. How do Pre-K CLASS Spring Instructional Support moderate the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and Phonological Awareness?	Spring Instructional Support, EOY Vocabulary, EOY Phonological Awareness	Classroom Assessment Scoring System, CIRCLE CLI Engage	Means, SD, Moderation Analysis, Structural Equation Modeling	Table and figure for Unstandardized Coefficients

Summary

This chapter delineated a structural equation modeling research design that investigated vocabulary and phonological awareness knowledge in Pre-K and the instructional classroom interactions associated with the vocabulary and phonological awareness skills. The chapter described details about the participants, sampling method, protection of participants, procedures, instruments of CLASS and CIRCLE CLI Engage and plans for data collection. Lastly, the plans for data analysis were explained for each of the research questions.

CHAPTER IV

RESULTS

The quantitative study examined on-track benchmark classroom children's scores of phonological awareness and vocabulary knowledge across time at the beginning, middle, and end of a Pre-K year. The study also investigated the association between Pre-K classroom instructional interactions supporting PA and vocabulary knowledge. The literature review delineated the current research and described the projected relationships of PA, vocabulary, and effective instructional support classroom interactions in the current study. The cognitive development theory and the social interactionist theory provided theoretical frameworks to guide the study. The sample comprised of 325 Pre-K classrooms from an ISD in Texas. The research questions and hypotheses included:

1. Are on-track beginning of the year (BOY) benchmark classroom scores of Vocabulary associated with middle of the year (MOY) on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?
2. Are on-track BOY benchmark classroom scores of Phonological Awareness associated with MOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?
3. Are on-track MOY benchmark classroom scores of Vocabulary associated with end of year (EOY) on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?
4. Are on-track MOY benchmark classroom scores of Phonological Awareness associated with EOY on-track benchmark classroom scores of Vocabulary and Phonological Awareness in Pre-Kindergarten?

5. Are Pre-Kindergarten CLASS instructional support scores from fall associated with spring classroom scores?
6. How do Pre-Kindergarten CLASS Spring Instructional Support scores moderate the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and Phonological Awareness?

Preliminary Analyses

The preliminary analyses consisted of descriptive and parametric statistics using IBM SPSS Version 25. Descriptive statistics investigated the characteristics of the sample of the mean, standard deviations, and assumptions of normality and non-zero variance. Pearson correlations tested for multicollinearity to ensure accurate interpretations of the relationships between the variables. The results were analyzed and reported.

Descriptive Statistics

Vocabulary

On-track benchmark classroom scores of children in each of the 325 classrooms of vocabulary from BOY, MOY, and EOY were measured with the CIRCLE CLI Engage (Landry et al., 2014) assessment tool. The vocabulary on-track benchmark classroom scores included BOY (M = .43, SD = .22), MOY (M = .58, SD = .23), and EOY (M = .68, SD = .24; see Table 3). The scores ranged from 0% to 100% with 0% signifying none of the children and 100% denoting all the children in the classroom meeting on-track benchmark scores in vocabulary. The mean on-track benchmark classroom scores of Vocabulary BOY presented at 43%, MOY at 58%, and EOY at 68%. The values for skewness ranged from -.63 to .36, and kurtosis ranged from -.49 to -.29; therefore, the assumption for normality was met with values of skewness less than 3 and

kurtosis less than 10 (Fields, 2017). The variance statistics yielded values greater than zero to meet the assumption of non-zero variance.

Table 3

Descriptive Statistics for On-Track Benchmark Classroom Scores of Vocabulary (N = 325)

	M	*SD*	Range	Variance	Skewness	Kurtosis
Vocabulary BOY	.43	.22	0.0-1.0	.05	.36	-.29
Vocabulary MOY	.58	.23	0.0-1.0	.06	-.32	-.49
Vocabulary EOY	.68	.24	0.0-1.0	.06	-.63	-.37

Phonological Awareness

On-track benchmark classroom scores of children in each of the 325 classrooms of PA from BOY, MOY, and EOY were measured with the CIRCLE CLI Engage (Landry et al., 2014) assessment tool. PA BOY consisted of the subskills of syllables, alliteration, and rhyming. SPSS removed the subskill of letter sounds at BOY due to the presence of zero variance as evident of the classrooms scoring at 0% of Pre-K children not knowing letter sounds at BOY. PA MOY and EOY included the subskills of syllables, alliteration, rhyming, and letter sounds. The PA on-track benchmark classroom scores consisted of BOY (M = .14, SD = .15), MOY (M = .53, SD = .19), and EOY (M = .73, SD = .18; see Table 4). The scores ranged from 0% to 100% with 0% signifying none of the children and 100% denoting all the children in the classroom meeting on-track benchmark scores in PA. The mean on-track benchmark classroom scores for PA at BOY presented at 14% and rapidly increased to 53% at MOY and 73% at EOY. See Table 2 for the

descriptive statistics for the subskills of syllables, alliteration, rhyming, and letter sounds. PA from BOY, MOY, and EOY met the assumption for normality with values of skewness less than 3 and kurtosis less than 10 (Fields, 2017). Alliteration BOY was the only PA subskill reporting kurtosis of 10.87 due to frequency of 163 scores or 50% of the sample recorded at 0% of meeting on-track benchmark classroom scores and 75% of the sample scoring under 10%. The variance statistics showed values greater than zero to meet the assumption of non-zero variance.

Table 4

Descriptive Statistics for Phonological Awareness Study Variables (N = 325)

	M	*SD*	Range	Variance	Skewness	Kurtosis
Syllables BOY	.15	.20	0.0-1.00	.04	1.89	3.58
Syllables MOY	.53	.25	0.0-1.00	.06	-.06	-.84
Syllables EOY	.77	.22	0.0-1.00	.05	-1.22	1.22
Alliteration BOY	.07	.12	0.0- .75	.01	2.83	10.87
Alliteration MOY	.31	.23	0.0-1.00	.05	.73	-.24
Alliteration EOY	.58	.26	0.0-1.00	.07	-.29	-.97
Rhyming BOY	.21	.26	0.0-1.00	.07	1.24	.39
Rhyming MOY	.53	.30	0.0-1.00	.09	-.09	-1.23
Rhyming EOY	.75	.26	0.0-1.00	.07	-1.05	.15
Letter Sounds MOY	.76	.29	0.0-1.00	.09	-1.65	1.75
Letter Sounds EOY	.83	.23	0.0-1.00	.05	-2.23	5.15
PA BOY	.14	.15	0.0- .84	.02	1.49	2.26
PA MOY	.53	.19	.05- .94	.04	.00	-.70

	M	*SD*	Range	Variance	Skewness	Kurtosis
PA EOY	.73	.18	.13-1.0	.03	-.54	-.46

Instructional Support

Instructional support scores from fall and spring were measured with the CLASS (Pianta et al., 2008). The overall scores of instructional support fall (*M* = 3.58, *SD* = .90) consisted of the three fall subskill scores of concept development (*M* = 3.27, *SD* = .91), quality of feedback (*M* = 3.77, *SD* = 1.05), and language modeling (*M* = 3.69, *SD* = 1.00; see Table 5). The overall scores of instructional support spring (*M* = 3.52, *SD* = .79) included the three spring subskill cores of concept development (*M* = 3.13, *SD* = .83), quality of feedback (*M* = 3.66, *SD* = .95), and language modeling (*M* = 3.75, *SD* = .87). The scores ranged from 1.00 to 6.25. CLASS categorizes the quality of classroom interactions with the numerical scores of low- (scores of 1 and 2), mid- (scores of 3 - 5), and high- (scores of 6 and 7; Pianta et al., 2008). The values for skewness ranged from .15 to .98, and kurtosis ranged from -.54 to 1.26; therefore, the assumption for normality was met with values of skewness less than 3 and kurtosis less than 10 (Fields, 2017). The variance statistics revealed values greater than zero to meet the assumption of non-zero variance.

Table 5

Descriptive Statistics for Instructional Support Study Variables (N = 325)

	M	*SD*	Range	Variance	Skewness	Kurtosis
Concept Develop Fall	3.27	.91	1.25-5.75	.83	.43	-.02
Quality Feedback Fall	3.77	1.05	1.00-6.25	1.10	.28	-.54
Language Modeling Fall	3.69	1.00	1.25-6.25	1.00	.21	-.25
Instructional Support Fall	3.58	.90	1.67-5.92	.82	.27	-.31
Concept Develop Spr.	3.13	.83	1.75-6.25	.69	.98	1.26
Quality Feedback Spr.	3.66	.95	1.50-6.00	.90	.40	-.35
Language Modeling Spr.	3.75	.87	1.25-6.0	.76	.15	-.34
Instructional Support Spr.	3.52	.80	1.58-6.0	.63	.45	.08

Relationships Between the Variables

The linear strength of the relationships between all the study variables and multicollinearity between the variables were evaluated by conducting tests of Pearson correlation (see Table 6). The values attributed to multicollinearity indicated Pearson correlation coefficients of over .8 (Fields, 2017). Pearson correlations showed no multicollinearity with all the study variables coefficient values under .8 and yielded the following values.

Table 6

Correlation Table for Study Variables (N = 325)

	1	2	3	4	5	6	7	8
1. Voc. BOY	-							
2. Voc. MOY	.55***	-						
3. Voc. EOY	.37***	.64***	-					
4. PA BOY	.38***	.03	.01	-				
5. PA MOY	.17**	.20***	.24***	.41***	-			
6. PA EOY	.11	.13*	.37***	.25***	.71***	-		
7. IS Fall	.06	.12*	.07	.05	.02	-.01	-	
8. IS Spr.	.04	.17**	.16**	.00	.03	-.04	.33***	-

* $p < .05$, ** $p < .01$, *** $p < .001$.

Vocabulary

Correlations for vocabulary on-track benchmark classroom scores consisted of Vocabulary BOY and Vocabulary MOY ($r = .55$, $p < .001$), Vocabulary BOY and Vocabulary EOY ($r = .37$, $p < .001$), and Vocabulary MOY and Vocabulary EOY ($r = .64$, $p < .001$).

Phonological Awareness

Correlations for phonological awareness on-track benchmark classroom scores included PA BOY and PA MOY ($r = .41$, $p < .001$), PA BOY and PA EOY ($r = .25$, $p < .001$), and PA MOY and PA EOY ($r = .71$, $p < .001$).

Vocabulary and Phonological Awareness

Correlations for vocabulary and PA on-track benchmark classroom scores comprised of Vocabulary BOY and PA BOY ($r = .38$, $p < .001$), Vocabulary BOY and PA MOY ($r = .17$, $p = .003$), Vocabulary BOY and PA EOY ($r = .11$, $p = n.s.$), Vocabulary MOY and PA BOY ($r = .03$, $p = n.s.$), Vocabulary MOY and PA MOY ($r = .20$, $p < .001$), Vocabulary MOY and PA EOY ($r = .13$, $p = .02$), Vocabulary EOY and PA BOY ($r = .01$, $p = n.s.$), Vocabulary EOY and PA MOY ($r = .24$, $p < .001$), and Vocabulary EOY and PA EOY ($r = .37$, $p < .001$).

Vocabulary and Instructional Support

Correlations for vocabulary and instructional support on-track benchmark classroom scores involved Vocabulary BOY and Instructional Support Fall ($r = .06$, $p = n.s.$), Vocabulary BOY and Instructional Support Spring ($r = .04$, $p = n.s.$), Vocabulary MOY and Instructional Support Fall ($r = .12$, $p = .04$), Vocabulary MOY and Instructional Support Spring ($r = .17$, $p = .002$), Vocabulary EOY and Instructional Support Fall ($r = .07$, $p = n.s.$), and Vocabulary EOY and Instructional Support Spring ($r = .16$, $p = .01$).

Phonological Awareness and Instructional Support

Correlations for PA and instructional support on-track benchmark classroom scores encompassed PA BOY and Instructional Support Fall ($r = .05$, $p = n.s.$), PA BOY and Instructional Support Spring ($r = .003$, $p = n.s.$), PA MOY and Instructional Support Fall ($r = .02$, $p = n.s.$), PA MOY and Instructional Support Spring ($r = .03$, $p = n.s.$), PA EOY and Instructional Support Fall ($r = -.01$, $p = n.s.$), and PA EOY and Instructional Support Spring ($r = -.04$, $p = n.s.$).

Instructional Support

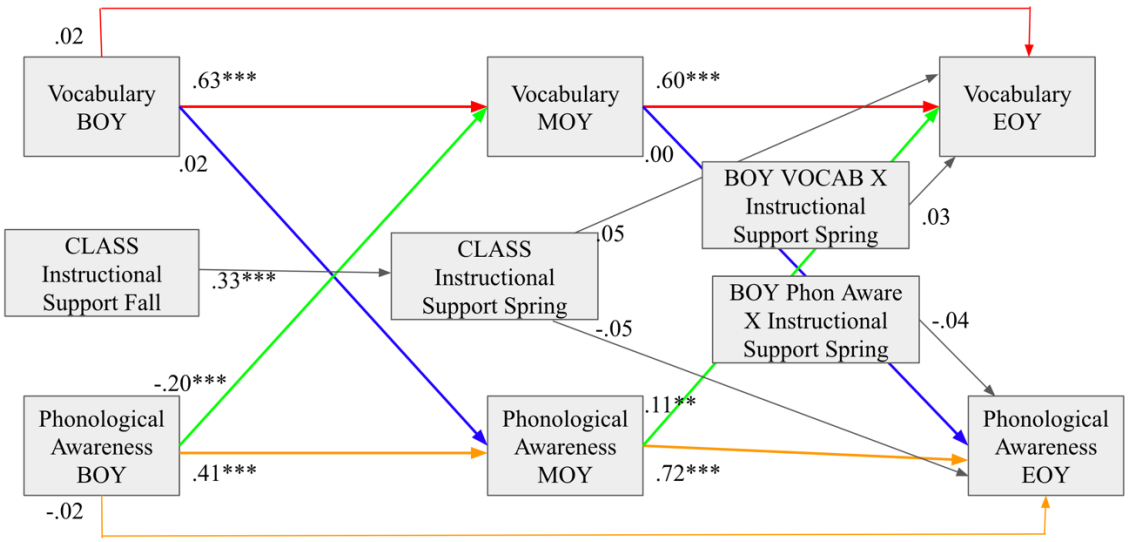
Correlations for instructional support on-track benchmark classroom scores consisted of Instructional Support Fall and Instructional Support Spring ($r = .33$, $p < .001$). In summary, all variables in the study met the assumptions for parametric statistics of normality, non-zero variance, and multicollinearity. The variables were converted to *z*-scores as standardized values in SPSS. The SPSS file was converted to a dat file to be read in Mplus Version 8.6.

Main Analyses

The data was analyzed using Mplus Version 8.6. Statistical requirements for good model fit parameters included RMSEA below .08 with the value between 90% confidence interval (CI), CFI and TLI values above .90, and SRMR below .10. The model fit the data adequately ($\chi^2(19) = 50.29$, $p < .001$; RMSEA = 0.07 (90% CI = 0.04, 0.09); CFI = .96; TLI = .92; and SRMR = 0.06). Through chi-square difference testing, the model modification indices signified the addition of Vocabulary MOY correlated with PA MOY will improve the chi-square value model fit by 19.35 with 1 degree of freedom and an associated $p < .001$ value. The model was conducted again with the addition of Vocabulary MOY correlated with PA MOY to improve model fit. The model fit improved significantly and fit the data adequately ($\chi^2(18) = 30.34$, $p = .03$; RMSEA = 0.05 (90% CI = 0.01, 0.07); CFI = .98; TLI = .97; and SRMR = 0.05). A visual representation with the values is displayed in Figure 2. The study investigated the research questions 1- 6, and the results are delineated in the next sections.

Figure 2

Results of Model Fit Conceptual Model of Study Variables (N = 325)



Note. The model shows autoregressive cross-lag results of on-track benchmark classroom scores of BOY, MOY, and EOY of Vocabulary and PA. The model includes moderation results of the interaction of CLASS Instructional Support Spring and Vocabulary BOY on Vocabulary EOY, and the interaction of CLASS Instructional Support and PA BOY on PA EOY. Model fit indices are: $\chi^2(18) = 30.34$, $p = .03$; RMSEA = 0.05 (90% CI = 0.01, 0.07); CFI = .98; TLI = .97; and SRMR = 0.05. *$p < .05$. **$p < .01$. ***$p < .001$.

Research Question 1 and 3

The first research question examined the relationship between on-track BOY benchmark classroom scores of Vocabulary with MOY on-track benchmark classroom scores of Vocabulary and PA in Pre-K. On-track BOY benchmark classroom scores of Vocabulary were significantly associated with MOY on-track benchmark classroom scores of Vocabulary ($b = .63$, $p < .001$), and not significantly associated with MOY on-track benchmark classroom scores of PA ($b = .02$,

p = .79). As on-track BOY benchmark classroom scores of Vocabulary increased by 1 standard deviation, MOY on-track benchmark classroom scores of Vocabulary increased by .63 standard deviations while controlling for the other associations of the model. The results showed positive relationships between BOY Vocabulary and MOY Vocabulary. The analyses yielded that on-track BOY benchmark classroom scores of Vocabulary significantly impacted MOY on-track benchmark classroom scores of Vocabulary. However, the results of on-track BOY benchmark classroom scores of Vocabulary did not significantly impact MOY on-track benchmark classroom scores of PA and showed no relationship.

The third research question examined the relationship between on-track MOY benchmark classroom scores of Vocabulary with EOY on-track benchmark classroom scores of Vocabulary and PA in Pre-K. On-track MOY benchmark classroom scores of Vocabulary were significantly associated with EOY on-track benchmark classroom scores of Vocabulary (b = .60, p < .001), and not significantly associated with EOY on-track benchmark classroom scores of PA (b = .00, p = .99). As on-track MOY benchmark classroom scores of Vocabulary increased by 1 standard deviation, EOY on-track benchmark classroom scores of Vocabulary increased by .60 standard deviations while controlling for the other associations of the model. The results showed positive relationships between MOY and EOY Vocabulary. The analysis showed that on-track MOY benchmark classroom scores of Vocabulary significantly impacted EOY on-track benchmark classroom scores of Vocabulary. However, the results of on-track MOY benchmark classroom scores of Vocabulary did not significantly impact EOY on-track benchmark classroom scores of PA and showed no relationship.

Research Question 2 and 4

The second research question examined the relationship between on-track BOY benchmark classroom scores of PA with MOY on-track benchmark classroom scores of Vocabulary and PA in Pre-K. On-track BOY benchmark classroom scores of PA were significantly associated with MOY on-track benchmark classroom scores of Vocabulary (b = -.20, p < .001), and PA (b = .41, p < .001). The results showed a negative relationship between BOY PA with MOY Vocabulary. As on-track BOY benchmark classroom scores of PA increased by 1 standard deviation, MOY on-track benchmark classroom scores of Vocabulary decreased by .20 standard deviations while controlling for the other associations of the model. A positive relationships between BOY PA with MOY PA was observed. As on-track BOY benchmark classroom scores of PA increased by 1 standard deviation, MOY on-track benchmark classroom scores of PA increased by .41 standard deviations while controlling for the other associations of the model. The results yielded that on-track BOY benchmark classroom scores of PA significantly impacted MOY on-track benchmark classroom scores of Vocabulary in a negative form and PA in a positive manner.

The fourth research question examined the relationship between on-track MOY benchmark classroom scores of PA with EOY on-track benchmark classroom scores of Vocabulary and PA in Pre-K. On-track MOY benchmark classroom scores of PA were significantly associated with EOY on-track benchmark classroom scores of Vocabulary (b = .11, p = .008) and PA (b = .72, p < .001). As on-track MOY benchmark classroom scores of PA increased by 1 standard deviation, EOY on-track benchmark classroom scores of Vocabulary increased by .11 standard deviations and PA increased by .72 standard deviations while controlling for the other associations of the model. The analyses showed positive relationships

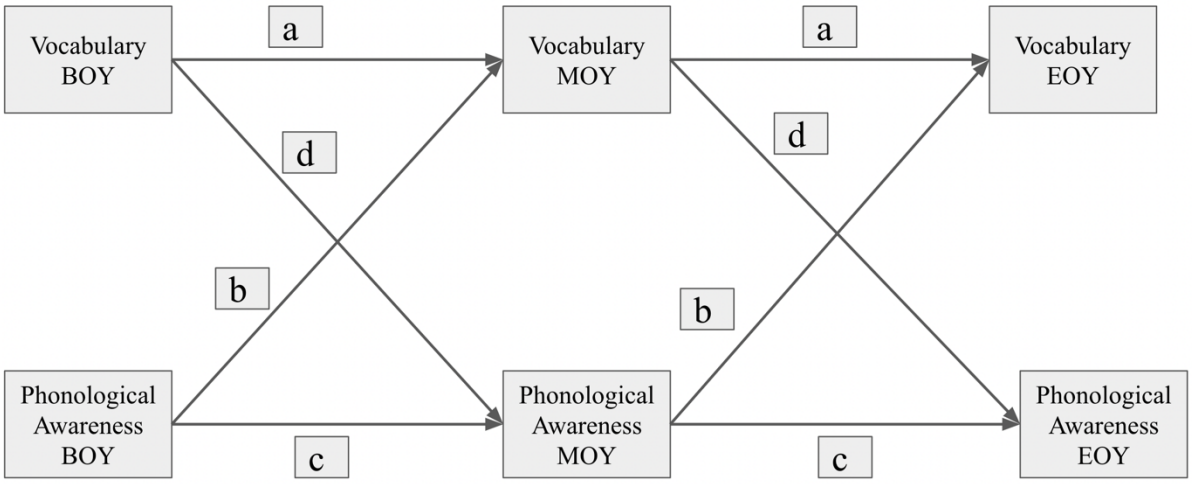
between on-track benchmark classroom scores of MOY PA and on-track benchmark classroom scores of EOY Vocabulary and PA. The results depicted that on-track MOY benchmark classroom scores of PA significantly impacted EOY on-track benchmark classroom scores of Vocabulary and PA.

Evaluation of Autoregressive and Cross-Lag Paths

The model investigated the BOY, MOY, and EOY Vocabulary and PA autoregressive and cross-lag paths. Autoregressive is a longitudinal design that assesses the stability of the same variable across time, such as Vocabulary at BOY, MOY, and EOY (Kline, 2016). Cross lag analysis aids in bidirectionality by assessing the stability of two variables across time, such as Vocabulary BOY impacting PA MOY (Kline, 2016). To increase parsimony, the freely estimated model excluded the moderating variables and correlated the corresponding variables of Vocabulary and PA at the time points of BOY, MOY, and EOY. The model fit the data adequately ($\chi^2(4) = 4.36$, $p = .36$; RMSEA = 0.02 (90% CI = 0.00, 0.09); CFI = .99; TLI = .98; and SRMR = 0.02). Therefore, the autoregressive and cross-lag paths were constrained, one at a time, across and between BOY, MOY, and EOY of Vocabulary and PA to determine stability over the time points (see Figure 3).

Figure 3

Constrained Autoregressive Cross-Lag of the Literacy Skills (N = 325)



Note. The letters indicate corresponding paths constrained to be equal for constraint testing analysis.

First, the autoregressive paths of on-track benchmark classroom scores BOY and MOY Vocabulary were constrained to be equal to MOY and EOY Vocabulary to determine stability over time. The model fit the data well ($\chi^2(5) = 4.39$, $p = .50$; RMSEA = 0.00 (90% CI = 0.00, 0.07); CFI = 1.00; TLI = 1.00; and SRMR = 0.02). Chi-square difference tests revealed that that the freely estimated model and partially constrained paths were not significantly different ($\chi^2 diff(1) = 0.03$, $p = .86$), and the partially constrained model was accepted. The on-track BOY, MOY, and EOY on-track benchmark scores of Vocabulary remained constrained. The analysis indicated that the paths across BOY, MOY, and EOY on-track benchmark scores of Vocabulary were equal and stable across time. The paths stayed the same and did not change across the time points.

Second, the autoregressive paths of on-track benchmark classroom scores BOY and MOY PA were constrained to be equal to MOY and EOY PA to determine stability over time. The model fit the data adequately ($\chi^2(5) = 25.09$, $p < .001$; RMSEA = 0.11 (90% CI = 0.07, 0.16); CFI = .97; TLI = .92; and SRMR = 0.06). Chi-square difference tests revealed that that the freely estimated model and partially constrained paths were significantly different (χ^2 *diff*(1) = 20.72, $p < .001$) and the partially constrained model was not accepted. The on-track BOY, MOY, and EOY benchmark scores of PA remained unconstrained. The analysis indicated that the paths across on-track BOY, MOY, and EOY on-track benchmark scores of PA were not equal and therefore not stable. The paths significantly changed and increased across the time points.

Third, the cross-lag paths on-track benchmark classroom scores of BOY Vocabulary and MOY PA were constrained to be equal to MOY Vocabulary and EOY PA to determine bi-directionality. The model fit the data well and improved ($\chi^2(5) = 4.52$, $p = .48$; RMSEA = 0.00 (90% CI = 0.00, 0.07); CFI = 1.0; TLI = 1.0; and SRMR = 0.02). Chi-square difference tests revealed that that the freely estimated model and partially constrained paths were not significantly different (χ^2 *diff*(1) = 0.13, $p = .72$) and the partially constrained model was accepted. The paths of on-track benchmark classroom scores of BOY Vocabulary and MOY PA and the on-track benchmark classroom scores of MOY Vocabulary and EOY PA remained constrained. The analysis indicated that the paths were equal and stable across time.

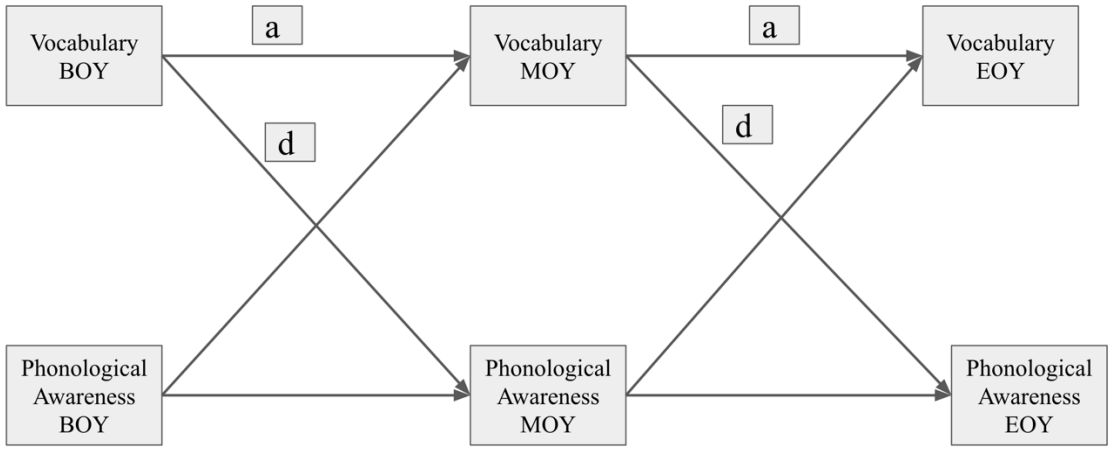
Lastly, the cross-lag paths of on-track benchmark classroom scores of BOY PA and MOY Vocabulary were constrained to be equal to MOY PA and EOY Vocabulary to determine bi-directionality. The model fit did not improve ($\chi^2(5) = 28.05$, $p < .001$; RMSEA = 0.12 (90% CI = 0.08, 0.15); CFI = .97; TLI = .90; and SRMR = 0.05). Chi-square difference tests revealed that that the freely estimated model and partially constrained paths were significantly different

(χ^2 *diff*(1) = 23.69, $p < .001$), and the partially constrained model was rejected. The on-track benchmark classroom scores of BOY PA and MOY Vocabulary and the on-track benchmark classroom scores of MOY PA and EOY Vocabulary remained unconstrained. The analysis indicated that the nonequivalent paths were not stable.

In summary, the autoregressive paths of on-track benchmark classroom scores of BOY and MOY Vocabulary and the on-track benchmark classroom scores of MOY and EOY Vocabulary were constrained to be equal (see Figure 4). Also, the cross-lag paths of on-track benchmark classroom scores of BOY Vocabulary and MOY PA and the on-track benchmark classroom scores of MOY Vocabulary and EOY PA were constrained to be equal. The remainder of the paths stayed unconstrained and freely estimated. Research questions 5 and 6 were assessed with this partially constrained model.

Figure 4

Partially Constrained Autoregressive Cross-Lag of the Literacy Skills (N = 325)



Note. The letters indicate corresponding paths constrained to be equal after constraint testing analysis. The remaining paths stayed unconstrained.

Research Question 5

The fifth research question examined the relationship between Pre-K CLASS instructional support fall and spring classroom scores. Instructional Support fall scores were significantly associated with Instructional Support spring scores ($b = .33$, $p < .001$; see Table 7). As Instructional Support fall scores increased by 1 standard deviation, Instructional Support spring scores increased by .33 standard deviations while controlling for the other associations of the model. Instructional Support fall scores were significantly associated with Instructional Support spring scores, and a positive relationship was evident.

Table 7

Unstandardized and Significance Levels for Final Partially Constrained Model (N = 325)

Parameter Estimate	Unstandardized	S.E.
Vocabulary BOY → Vocabulary MOY	.61***	.03
Vocabulary BOY → PA MOY	.01	.03
Vocabulary MOY → Vocabulary EOY	.61***	.03
Vocabulary MOY → PA EOY	.01	.03
PA BOY → PA MOY	.41***	.05
PA BOY → Vocabulary MOY	-.20***	.05
PA MOY → PA EOY	.72***	.04
PA MOY → Vocabulary EOY	.11**	.04
Instruction Support Fall → Instruction Support Spring	.33***	.05
Vocabulary BOY → Vocabulary EOY	.01	.04
Voc. BOY X Instruction Support Spring → Voc. EOY	.03	.04

Parameter Estimate	Unstandardized	S.E.
Instruction Support Spring → Vocabulary EOY	.04	.04
Instruction Support Spring → PA EOY	-.05	.04
PA BOY → PA EOY	-.02	.04
PA BOY X Instruction Support Spring → PA EOY	-.04	.03

Note. $\chi^2(26) = 39.76$, $p = .04$; RMSEA = 0.04 (90% CI = 0.01, 0.06); CFI = .98; TLI = .97; and SRMR = 0.05. *$p < .05$. **$p < .01$. ***$p < .001$.

Research Question 6

The sixth research question investigated whether CLASS spring Instructional Support scores moderated the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and PA. Moderation analysis examines if the relationship between two variables depends on a third variable (Kline, 2016). The interaction term of Instructional Support and BOY Vocabulary was not significantly associated with EOY Vocabulary ($b = .03$, $p = .39$), while the study variables were at zero (see Table 7). The interaction of lnstructional Support and BOY Vocabulary does not moderate the relationship between BOY Vocabulary and EOY Vocabulary. In other words, the on-track benchmark classroom scores from BOY and EOY Vocabulary did not depend on spring Instructional Support scores. The interaction term of Instructional Support and BOY PA was not significantly associated with EOY PA ($b = -.04$, $p = .21$), while the study variables were at zero. The interaction of lnstructional Support and BOY PA does not moderate the relationship between BOY PA and EOY PA. In other words, the on-track benchmark classroom scores from BOY and EOY PA was not associated with spring Instructional Support scores.

In conclusion, the final model consisted of the autoregressive paths of on-track benchmark classroom scores of BOY and MOY Vocabulary and the on-track benchmark classroom scores of MOY and EOY Vocabulary constrained to be equal. Also, the cross-lag paths of on-track benchmark classroom scores of BOY Vocabulary and MOY PA and the on-track benchmark classroom scores of MOY Vocabulary and EOY PA were constrained to be equal. The remainder of the paths remained unconstrained and freely estimated. The model fit improved and fit the data adequately $\chi^2(26) = 39.76$, $p = .04$; RMSEA = 0.04 (90% CI = 0.01, 0.06); CFI = .98; TLI = .97; and SRMR = 0.05 (see Table 7). The model accounted for 35.1% of the variance for Vocabulary MOY scores, 16.9% of the variance for Vocabulary EOY scores, 17.2% of the variance for PA MOY, 52% of the variance for PA EOY, and 10.8% of the variance for Instructional Support spring.

Summary

The chapter described the results from the preliminary and main analyses of the study. Descriptive statistics examined the characteristics of the sample of the mean, standard deviations, and assumptions of normality and non-zero variance. Pearson correlations tested for multicollinearity to ensure accurate interpretations of the relationships between the variables. All variables in the study met the assumptions for parametric statistics in the pre-liminary analyses.

The main analyses of freely estimated results yielded adequate model fit. Research question 1 showed that on-track BOY benchmark classroom scores of Vocabulary were significantly associated with MOY on-track benchmark classroom scores of Vocabulary and not significantly associated with MOY on-track benchmark classroom scores of PA. Research question 2 revealed that on-track BOY benchmark classroom scores of PA were significantly associated with MOY on-track benchmark classroom scores of PA and Vocabulary. Research

question 3 depicted that on-track MOY benchmark classroom scores of Vocabulary were significantly associated with EOY on-track benchmark classroom scores of Vocabulary, and not significantly associated with EOY on-track benchmark classroom scores of PA. Research question 4 found that on-track MOY benchmark classroom scores of PA were significantly associated with EOY on-track benchmark classroom scores of PA and Vocabulary. Positive relationships were observed for all except a negative relationship between on-track BOY benchmark classroom scores of PA and MOY on-track benchmark classroom scores of Vocabulary. Research question 5 yielded that Instructional Support fall scores were significantly associated with Instructional Support spring scores. Research question 6 demonstrated that CLASS spring Instructional Support scores did not moderate the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and PA.

Chi-difference tests resulted in the final model consisting of the autoregressive paths of on-track benchmark classroom scores of BOY and MOY Vocabulary and the on-track benchmark classroom scores of MOY and EOY Vocabulary constrained to be equal and showed stability across the time points. The cross-lag paths of on-track benchmark classroom scores of BOY Vocabulary and MOY PA and the on-track benchmark classroom scores of MOY Vocabulary and EOY PA were also constrained to be equal and showed stability across the time points. The remainder of the paths remained unconstrained and freely estimated. The results for the research questions 1-6 were displayed in figures and tables in this chapter and will be discussed in Chapter 5.

CHAPTER V

DISCUSSION

This study investigated on-track benchmark classroom scores of vocabulary and phonological awareness knowledge at BOY, MOY, and EOY in Pre-K. The study also examined CLASS Instructional Support scores gathered in the spring that moderated the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and PA. The chapter delineates a discussion of the findings, recommendations, limitations, implications, directions for future research, and conclusions of the research study.

Vocabulary

Research question 1 showed that on-track BOY benchmark classroom scores of Vocabulary were significantly associated with MOY on-track benchmark classroom scores of Vocabulary. Research question 3 depicted that on-track MOY benchmark classroom scores of Vocabulary were significantly associated with EOY on-track benchmark classroom scores of Vocabulary. The on-track BOY benchmark classroom scores of Vocabulary positively impacted the MOY on-track benchmark classroom scores of Vocabulary and the MOY on-track benchmark classroom scores of Vocabulary positively impacted EOY on-track benchmark classroom scores of Vocabulary. The autoregressive paths from on-track benchmark classroom scores of Vocabulary BOY to MOY and Vocabulary MOY to EOY were equivalent and not significantly different. Therefore, the corresponding paths were stable across the time points.

According to Bruner's (1981) theoretical concept of LASS, the children's semantics or vocabulary words developed as the children heard the syntax of the structure of language through back-and-forth conversations with caregivers. The study results yielded minimal increase in children's vocabulary acquisition. Research stated that the rate of vocabulary development in

children 2 years of age was associated with the caregiver's complexity of language with longer utterances yielding children's higher vocabulary scores (Hoff, 2003). Teachers may not have provided longer utterances with discussions and descriptions of word meaning. The complexity of children's language input or adults talking to children influenced the children's language growth of syntax and semantics (Pelatti et al., 2013).

In addition, the study results of the equivalent paths of on-track benchmark classroom scores of Vocabulary BOY to MOY and Vocabulary MOY to EOY yielded no significant change across the time points. In the district curriculum of the read-aloud, morning message, and small group lessons, teachers may not have employed complex sentences with adjectives and adverbs that advance the growth of children's vocabulary knowledge. Specifically, Farrow et al. (2018) found a significant relationship between the teachers' complex use of language during the morning message and small group activities. Children increase vocabulary depth of knowing the meaning of words through interactions of back-and-forth exchanges with the novel vocabulary word (Hadley et al., 2018). Pre-K teachers in the ISD may have labeled or provided quick definitions rather than engaging in meaningful back-and-forth discussions of the novel vocabulary words. Piaget's (1936/1952) theory explained that children assimilate and accommodate new word learning by actively constructing knowledge in multiple opportunities through descriptions of taxonomy, context, perceptual, and functional.

Phonological Awareness

Research question 2 demonstrated that on-track BOY benchmark classroom scores of PA were significantly associated with MOY on-track benchmark classroom scores of PA. Research question 4 found that on-track MOY benchmark classroom scores of PA were significantly associated with EOY on-track benchmark classroom scores of PA. The on-track BOY

benchmark classroom scores of PA positively impacted the MOY on-track benchmark classroom scores of PA and the MOY on-track benchmark classroom scores of PA positively impacted EOY on-track benchmark classroom scores of PA. The autoregressive paths from on-track benchmark classroom scores of PA BOY to MOY and PA MOY to EOY increased and significantly changed. The results yielded significantly different nonequivalent paths and therefore, PA is not stable across the time points. The nonequivalent paths may pertain to the low scores of BOY on-track benchmark classroom scores of PA.

The low scores of PA BOY reflect young children at BOY of Pre-K possessing little PA knowledge. The rapid increase of PA during the time points from BOY to MOY, and MOY to EOY may be attributed to direct instruction of the PA skills. Direct instruction of PA was not measured in this research study, but it is part of the ISD curriculum. Findings from other researchers showed that direct instruction and invented play experiences increased knowledge in PA (Cavanaugh et al., 2017; Roskos & Christie, 2013). Moreover, direct instruction in rhyming and alliteration advanced the children's knowledge of letter sound correspondence (Cardoso-Martins et al., 2011). Through direct instruction, teachers focus on the parts of a word to emphasize syllabication, the ending letter sounds of words to augment rhyming, and the beginning letter sounds of words to promote alliteration. Bruner (1960) stipulated that children construct knowledge through the teacher facilitating and scaffolding the learning process (Olson, 2007).

Vocabulary and Phonological Awareness

Research question 1 yielded that on-track BOY benchmark classroom scores of Vocabulary were not associated with MOY on-track benchmark classroom scores of PA. Research question 3 revealed that the on-track MOY benchmark classroom scores of Vocabulary

were not associated with EOY on-track benchmark classroom scores of PA. The on-track benchmark classroom scores of Vocabulary at the different time points did not impact the on-track benchmark classroom scores of PA. The on-track benchmark classroom scores between BOY Vocabulary and MOY PA and between MOY Vocabulary and EOY PA indicated no significant differences, stayed the same, and showed stability across time. The results indicated no relationship between vocabulary and PA.

The outcome from this study does not correspond to the past research of vocabulary being associated with phonological acquisition. Past research on preschool and school age children ages 2 to 7 years revealed that the relationship between vocabulary and phonological sensitivity was bi-directional with each influencing the other (Storkel & Morrisette, 2002). Children's vocabulary influenced phonological acquisition and in turn PA influenced vocabulary acquisition. Regarding vocabulary influencing PA, past findings indicated that frequent vocabulary words more readily promoted phonological sensitivity in contrast to rare or infrequent vocabulary words (Storkel & Morrisette, 2002). The CIRCLE CLI Engage vocabulary words utilized in the PA assessments may not have been frequent words utilized in the children's vocabulary, such as the words sail and wagon.

Phonological Awareness and Vocabulary

Research question 2 demonstrated that on-track BOY benchmark classroom scores of PA were significantly associated with MOY on-track benchmark classroom scores of Vocabulary. Research question 4 found that on-track MOY benchmark classroom scores of PA were significantly associated with EOY on-track benchmark classroom scores of Vocabulary. The results from this study also confirmed past research of PA influencing vocabulary acquisition (Ramachandra et al., 2011; Read et al., 2014; Storkel & Morrisette, 2002). Specifically, past

findings showed that Pre-K children learned more readily new vocabulary from words composed of common phonetic patterns as opposed to words with rare sound patterns (Storkel & Morrisette, 2002). Stories with rhyme contributed to children's vocabulary word identification and resulted in new word learning (Read et al., 2014). Rhyming tasks of matching objects that end with the same sounds promoted phonological sensitivity of rhyme awareness and novel word learning in Pre-K (Ramachandra et al., 2011).

Specifically, the on-track BOY benchmark classroom scores of PA negatively impacted the MOY on-track benchmark classroom scores of Vocabulary. Pre-K children at BOY may have lacked knowledge of PA skills to affect novel vocabulary learning. In contrast, the on-track MOY benchmark classroom scores of PA positively impacted EOY on-track benchmark classroom scores of Vocabulary. Children may have experienced repeated exposure or direct instruction of the PA skills at MOY to have attained a positive impact at EOY Vocabulary. The paths of on-track benchmark classroom scores between BOY Vocabulary and MOY PA and between MOY Vocabulary and EOY PA indicated significant differences and instability due to the negative and positive changes across the time points.

Instructional Support

Research question 5 yielded that Instructional Support fall scores were significantly associated with Instructional Support spring scores. Effective classroom Instructional Support quality in the ISD was set at 3.30 which corresponded to the low end of the mid-quality 3.0 - 5.0 range of the CLASS measure. Instructional Support fall mean scores resulted in 3.58 and 3.52 for spring mean scores with a slight decrease of .06. Specifically, the Instructional Support fall scores of Concept Development and Quality of Feedback decreased minimally, and Language Modeling increased slightly. The slight decrease of scores in Concept Development and Quality

of Feedback was unexpected and targeted professional development to increase the quality of interactions would be beneficial.

According to CLASS, instructional support classroom interactions categorized as mid-quality with numerical scores of 3.0 - 5.0 sometimes promote critical thinking of analysis and reasoning, occasionally engage in back-and-forth feedback loops to increase understanding, and at times employ language facilitation techniques to increase language (Pianta et al., 2008). The results of this study showed instructional support mean scores at 3.5 in the low end of the mid-quality range indicating some of the instructional interactions categorized as low-quality range. Instructional support classroom interactions categorized as low-quality rarely promote critical thinking of analysis and reasoning, seldom engage in back-and-forth feedback loops to increase understanding, and barely employ language facilitation techniques to increase language (Pianta et al., 2008).

Instructional Support, Vocabulary, and Phonological Awareness

Research question 6 demonstrated that CLASS Spring Instructional Support scores did not moderate the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and PA. This research finding does not coincide with past research of instructional support scores of mid- to high-quality producing increased scores in the children's academic and language skills (Burchinal et al., 2010; Mashburn et al., 2008). Specifically, higher levels of instructional support yielded increased scores in vocabulary and letter-sound recognition in children ages 3 to 5 years in a Head Start program (Bulotsky-Shearer et al., 2020). The contradictory findings of this study may be attributed to the levels of Instructional Support spring scores positioning in the lower levels of the mid-quality range of Instructional Support. The classroom teacher-children instructional interactions may not be sufficiently high or effective to

moderate the vocabulary and PA scores from BOY to EOY. The minimal increases across the time points in vocabulary yielded no significant change in the children's vocabulary growth. Although the growth in PA was significant, the types of interactions related to PA instruction that the teachers employed may not have been high-quality interactions as measured by CLASS.

Extant research related to instructional support interactions emphasized high scores in instructional support of concept development, quality of feedback, and language modeling yielded higher literacy scores (Curby et al, 2009; Goble et al, 2019; Pelatti et al., 2013; Solovieva & Quintanar, 2016). Pre-K children showed gains in literacy skills with higher scores in concept development classroom interactions (Curby et al, 2009; Goble et al, 2019). Increased levels of quality of feedback showed greater memory and executive functioning in Pre-K children (Goble et al., 2019; Solovieva & Quintanar, 2016). The complexity of children's language input or adults talking to children influenced the children's language growth of syntax and semantics (Pelatti et al., 2013). Bruner's LASS corresponds to the application of Concept Development, Quality of Feedback, and Language Modeling in the Pre-K classroom. Pre-K teachers engage in LASS to promote high-quality instructional support classroom interactions with numerical scores of 6.0 - 7.0. High-quality instructional classroom interactions include teachers consistently promoting the children's critical thinking of analysis and reasoning, engaging frequently in back-and-forth feedback loops with the children to increase understanding, and usually employing language facilitation techniques to increase the children's syntax and semantics (Pianta et al., 2008).

Recommendations for Pedagogy

The findings from this study showed that instructional support classroom interactions did not moderate the Pre-K children's vocabulary and PA knowledge. Pre-K teachers need

professional development to enhance instructional support classroom interactions related to vocabulary and PA. Recommendations to increase Instructional Support scores consist of augmenting Concept Development, Quality of Feedback, and Language Modeling in the areas that barely promote the instructional support interactions. In addition, teachers advance the current mid-quality instructional support classroom interactions to high-quality of numerical scores of 6.0-7.0 by increasing the frequency, depth, and consistency of the instructional support interactions related to the vocabulary and PA skills. To increase Concept Development scores, educators can advance interactions that always enable critical thinking skills of analysis and reasoning, such as children comparing, classifying, problem solving, experimenting, predicting, and evaluating. Teachers consistently provide children opportunities to brainstorm, plan, and generate ideas and products. Educators frequently integrate concepts with prior knowledge and connect concepts to real world experiences for vocabulary and PA skills (Pianta et al., 2008). See Appendix B for Concept Development vocabulary examples and Appendix C for Concept Development PA examples.

Educators augment Quality of Feedback scores by consistently scaffolding instruction to meet the needs of the children. Teachers frequently engage in feedback loops with the children to increase understanding and prompt the children's thought processes to foster metacognition. Educators always provide information to expand, clarify, encourage, and affirm the children's vocabulary and phonological awareness knowledge (Pianta et al., 2008). See Appendix D for vocabulary examples and Appendix E for PA examples. Educators consistently employ language facilitation techniques to advance Language Modeling. Interactions that promote Language Modeling include frequently employing back-and-forth conversations and open-ended questions to enable the children to utilize multi-word responses. Educators model language by repeating

and extending the children's responses, adding words to actions though self-and parallel talk, and engaging in advanced language of using vocabulary (Pianta et al., 2008). See Appendix F for vocabulary examples and Appendix G for PA examples.

Limitations

A limitation of the study was the generalizability of the findings regarding other Pre-K classrooms. The study examined children's vocabulary and PA scores and instructional support classroom interactions in the sample population of the ISD. The sample population may not represent Pre-K classrooms and students in other federal, state, and private Pre-K programs. The ISD Pre-K student population consisted of predominantly minority groups of 65% Hispanic and 26% Black. In addition, 92% of Pre-K students were recorded as economically disadvantaged. Another limitation was that the CLASS observations in a 2-hour period grants a minimal glimpse of the teacher-child interactions in the overall classroom setting. Observations may not be conducted during instructional times that promote the vocabulary and PA skills such as read-aloud, morning message and literacy small groups. Limitations consist of utilizing CLASS to measure classroom interactions in the two time points of fall and spring rather than three time points of BOY, MOY, and EOY to promote authentic representation and progress monitoring. Contributing factors of children and teacher illnesses may influence the interactions and negatively impact the scores which may not be indicative of the usual quality of the classroom interactions (Hatfield & Pianta, 2013). The limitation of individual coaches and teachers working on diverse CLASS dimensions may contribute to unequal time and inconsistent coaching support on the study variables.

A weakness of the study was the limited number of students and teachers' demographic information consisting of race, ethnicity, and home language. The demographic data can afford

descriptions and understanding of the teachers in the sample population. Also, the demographic data can act as covariates, which may influence the variables in the investigation (Pallant, 2016). This study did not employ demographic data as covariates, which may have influenced instructional support interactions moderating vocabulary and PA scores. The covariates of years of teaching experience and advance education degrees may have implications on vocabulary and PA learning, and the quality of the instructional classroom interactions (Dahmer, 2010; Knight 2007). Teachers with less than 5 years teaching experience report a lack of knowledge of PA instruction (Dahmer, 2010).

Implications

This study will benefit students, families, educators, administrators, researchers, policy makers, and society.

Children and Families

The results of this study highlight the importance of providing Pre-K children with high-quality instructional classroom interactions to develop the foundational skills of vocabulary and PA. The outcome shows that Pre-K children will benefit from incorporating PA skills in learning new vocabulary words. For example, children can clap the syllables or produce a rhyming word for the novel vocabulary word. Families will benefit from the knowledge of back-and-forth conversations impacting vocabulary and PA knowledge. Families can advance vocabulary knowledge through meaningful conversations with novel words. Families could promote PA through read-alouds, nursery rhymes, and games employing syllables, alliteration, and rhyming. Families can experience favorable outcomes of less stress associated with the children's academic future success. A strong literacy foundation also decreases the chances of the children needing extra help, such as tutoring, which may incur additional monetary expenses to families.

Educators and Administrators

The teachers can utilize the data and the potential findings to ponder on their own low-, mid-, and high-instructional classroom interactions. The teachers can create goals to improve instructional interactions that advance vocabulary and PA learning. The results from this study showed that the children's vocabulary did not impact phonological acquisition. Teachers can benefit from employing frequent words utilized in the children's vocabulary to advance PA. Effective instructional practices that lead to potential increased student scores can positively affect the teachers' performance ratings and compensations. Administrators can conduct evaluations to promote coaching and accountability on implementing effective classroom instructional interactions and practices that increase vocabulary and PA learning, such as CLASS observations. Moreover, administrators can provide staff professional development on PA and vocabulary learning. The increased student learning and scores may yield higher school rating which may increase school funding.

Researchers, Policy Makers, and Society

This study will lead researchers to implications on the utilization of robust statistical methods. The study utilizes an innovative analysis plan that yielded more precise results and rigor to causal relationships (Kline, 2016). Current policy of not providing universal preschool in the United States neglects to provide effective preschool programs for all children (Hatfield & Pianta, 2013). Furthermore, the struggling middle income families do not meet the income thresholds for educational services to attain quality preschool coverage (Hatfield & Pianta, 2013). Implications for policy makers include modifying regulations for quality standards on preschool classroom interactions by not utilizing CLASS in high stakes accountability to attain funding. Society will ultimately reap the benefit of children's literacy learning in preparing the

next generation for leadership in the 21st century. This study may transform classroom instructional support interactions to advance Pre-K vocabulary and PA learning.

Recommendations for Future Research

The literature review showed that effective instructional support classroom interactions in Pre-K impact children's literacy skills (Carr et al., 2019; Goble et al., 2019). Specifically, this study tested instructional support classroom interactions impacting the children literacy skills of PA and vocabulary. Future research can include additional variables of comprehension, alphabet knowledge, print concepts, and writing that other studies have examined (Vernon-Feagans et al., 2019). Findings showed that incorporating phonological instruction with writing activities result in increased learning because the literacy skills reinforce each other (Guo er al., 2018). Young children engaged in invented spelling to advance the skills of letter knowledge and PA (Bennett-Armistead et al., 2005). Invented spelling can be examined to assess the children's vocabulary and PA level. Comprehension, print concepts, and vocabulary instruction can be embedded in the children's writing and in shared writing such as the morning message (Guo er al., 2018; Wasik & Hindman, 2011). The literacy skills of vocabulary, PA, letter knowledge, print concepts, and comprehension can also be investigated through the implementation of read-alouds (Bennett-Armistead et al., 2005; Read et al., 2014; Yopp & Yopp, 2009). CLASS observers can measure read-alouds, morning message, centers, and small groups in the observation cycles to ensure the inclusion of all the skills.

Moreover, this research focused on instructional support interactions impacting children's vocabulary and PA knowledge. Next steps can extend the examination of emotional support and classroom organization interaction on the children's learning of the literacy skills, such as vocabulary and PA (Ansari & Pianta, 2018; Carr et al, 2019). The children's literacy skills can

be measured with the instrument of CIRCLE CLI Engage. Bruner (1983) thoroughly investigated children's learning through the back-and-forth interactions between caregiver and child (Olson, 2007). The instrument of CLASS can measure the emotional support and classroom organization interactions. The covariates of years of Pre-K teaching experience and teachers' educational level can be examined to account for the possible changes of the literacy skills over time (Dahmer, 2010; Knight, 2007).

This research study employed statistical analysis of SEM longitudinal design to investigate data at three time points during the Pre-K year. The literature review examined longitudinal data from Pre-K to third grade (Vernon-Feagans et al., 2019) and Pre-K to fifth grade (Ansari & Pianta, 2018). Subsequent studies can include language of instruction and track the children's progress in literacy from Pre-K to high school. Future directions can include advanced SEM statistical methods that allow the longitudinal investigations of multiple groups to investigate more sophisticated research questions and attain innovative findings. SEM enables the researcher to conduct one analysis in contrast to multiple analyses that increase familywise error (Kline, 2016). The implications of the use of SEM analysis advances rigor in causal inferences in the field of early childhood education.

Summary

The final chapter discussed the results of the research questions and connected the findings to previous research and theoretical frameworks. Based on the results, recommendations for pedagogy provided examples of effective Instructional Support interactions of Concept Development, Quality of Feedback, and Language Modeling to advance vocabulary and PA knowledge. Implications for students, families, educators, administrators, researchers, policy

makers, and society delineated the importance of the study. The chapter also listed the limitations of the study and specified directions for future research.

Conclusion

The critical period for children to gain the fundamental language and literacy skills transpire in the Pre-K years of ages 3 to 5 years (Ehri & Roberts, 2006; Philips et al., 2008). Research showed that high quality classroom interactions in instructional support influence subsequent academic success (Carr et al., 2019; Goble et al., 2019; Peisner-Feinberg et al., 2014). Instructional support interactions in Pre-K classroom indicated mostly low-quality and few mid-quality teacher-child interactions (Carr et al, 2019; La Paro et al., 2004). The lack of research on effective instructional classroom interactions that support Pre-K teachers created a rationale for the study and research questions. The quantitative study examined on-track benchmark classroom scores of PA and vocabulary knowledge across time at the beginning, middle, and end of the Pre-K year. The study also investigated the association between Pre-K classroom instructional interactions with PA and vocabulary knowledge. Piaget's theory of cognitive development provided a framework for examining PA and vocabulary knowledge. Bruner's theoretical concept of language acquisition support system presented a lens to view effective instructional classroom interactions that promote the vocabulary and PA skills. The literature review examined the proposed empirical relationships and extant research related to effective instructional classroom interactions and children's literacy of PA and vocabulary knowledge in Pre-K.

The study sample consisted of 2021-2022 secondary data from approximately 325 classrooms of children ages 4 to 5 years enrolled in Pre-K in an ISD. The CIRCLE CLI Engage (Landry et al., 2014) assessed the literacy skills of vocabulary and PA for Pre-K children. The

CLASS (Pianta et al., 2008) measured the quality of Pre-K classroom interactions in instructional support. Research questions 1, 2, 3, and 4 investigated the stability across time and bi-directionality of Vocabulary and PA taken at three time points of BOY, MOY, and EOY. Research question 5 examined the associations of instructional support scores collected in the fall and spring. Research question 6 analyzed Pre-K CLASS spring Instructional Support scores moderating the relationships of Pre-K on-track benchmark classroom scores from BOY and EOY Vocabulary and PA.

The preliminary analyses consisted of descriptive and parametric statistics using IBM SPSS Statistics Version 25. All variables in the study met the assumptions for parametric statistics. Using the statistical program Mplus version 8.6, an SEM autoregressive cross-lag and moderation analyses investigated the associations of the variables in the research questions of the study. The main analyses of freely estimated results yielded adequate model fit. The results from the main analyses answered the research questions. Research question 1 showed that on-track BOY benchmark classroom scores of Vocabulary were significantly associated with MOY on-track benchmark classroom scores of Vocabulary and not significantly associated with MOY on-track benchmark classroom scores of PA. Research question 2 revealed that on-track BOY benchmark classroom scores of PA were significantly associated with MOY on-track benchmark classroom scores of Vocabulary and PA. Research question 3 found that on-track MOY benchmark classroom scores of Vocabulary were significantly associated with EOY on-track benchmark classroom scores of Vocabulary and not significantly associated with EOY on-track benchmark classroom scores of PA. Research question 4 depicted that on-track MOY benchmark classroom scores of PA were significantly associated with EOY on-track benchmark classroom scores of Vocabulary and PA. Positive relationships were evident for all except a negative

relationship between on-track BOY benchmark classroom scores of PA and MOY on-track benchmark classroom scores of Vocabulary. Pre-K children at BOY may have lacked knowledge of PA skills to affect novel vocabulary learning.

Chi-difference tests resulted in the final model consisting of the autoregressive paths of on-track benchmark classroom scores of BOY and MOY Vocabulary and the on-track benchmark classroom scores of MOY and EOY Vocabulary constrained to be equal and showed stability across the time points. The cross-lag paths of on-track benchmark classroom scores of BOY Vocabulary and MOY PA and the on-track benchmark classroom scores of MOY Vocabulary and EOY PA were also constrained to be equal and showed stability across the time points. The remainder of the paths remained unconstrained and freely estimated.

Research question 5 demonstrated that Instructional Support fall scores were significantly associated with Instructional Support spring scores. Research question 6 yielded that CLASS spring Instructional Support scores did not moderate the relationship of on-track benchmark classroom scores from BOY and EOY Vocabulary and PA. The classroom teacher-children interactions may not be sufficiently high to moderate the vocabulary and PA scores from BOY to EOY. In addition, minimal increase in Vocabulary across the time points yielded no significant growth in children's vocabulary knowledge. Even though there was significant growth in PA across BOY, MOY, and EOY, the PA instructional interactions may not have been effective interactions as measured by CLASS. Recommendations for pedagogy provided examples to increase Instructional Support interactions of Concept Development, Quality of Feedback, and Language Modeling that influence vocabulary and PA knowledge. The study also revealed that the associations between vocabulary and PA were not bi-directional. Pre-K children's PA skills impacted vocabulary knowledge, but vocabulary did not impact the children's PA acquisition.

The findings will augment the extant research of the importance of effective Pre-K literacy instruction to promote readiness to be successful at the commencement of kindergarten and beyond.

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APPENDIX A

INSTITUTIONAL LETTERS OF APPROVAL

Texas Woman's University
Institutional Review Board (IRB)
irb@twu.edu
https://www.twu.edu/institutional-review-board-irb/

March 17, 2022

Margarita Cuervo
Human Dev & Family Studies, Literacy and Learning

Re: Exempt - IRB-FY2021-411 Pre-K Classroom Interactions Associated with Literacy Learning

Dear Margarita Cuervo,

The above referenced study has been reviewed by the TWU IRB - Denton operating under FWA00000178 and was determined to be exempt on March 11, 2022. If you are using a signed informed consent form, the approved form has been stamped by the IRB and uploaded to the Attachments tab under the Study Details section. This stamped version of the consent must be used when enrolling subjects in your study.

Note that any modifications to this study must be submitted for IRB review prior to their implementation, including the submission of any agency approval letters, changes in research personnel, and any changes in study procedures or instruments. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All modification requests, incident reports, and requests to close the file must be submitted through Cayuse.

On May 31, 2023, this approval will expire and the study must be renewed or closed. A reminder will be sent 45 days prior to this date.

If you have any questions or need additional information, please email your IRB analyst at irb@twu.edu or refer to the IRB website.

Sincerely,

TWU IRB - Denton

[redacted]
SUPERINTENDENT OF SCHOOLS

[redacted]

Ms. Margarita Cuervo
Texas Woman's University
[redacted]

RE: Pre-K Classroom Interactions Associated with Literacy Learning

Dear Ms. Cuervo:

The Research Review Board (RRB) of the [redacted]ndependent School District ([redacted] ISD) has reviewed and approved your proposal to conduct the above-referenced project. Based on the information provided, the committee concludes that the project serves a worthwhile purpose and will benefit the district. Approved project activities include:

- Collection and analyses of secondary data

It is our understanding that you have read and agreed to the terms described in the *Guidelines for Conducting Research in the [redacted]ndependent School District*. Please note that all school and district information, wherever applicable, should remain confidential within the limits of the law. In addition, any data collected from [redacted] ISD may be used solely for the purposes of the approved study.

Approval by the RRB does not guarantee that any [redacted] ISD department, school, or employee will comply with data requests for the study. If the study involves collection of primary data at a school or schools, the permission of the building principal(s) must be obtained separately from this approval.

Please provide the RRB with a copy of any data file constructed using [redacted] ISD student or personnel information, and a copy of your final report, within 30 days following the completion of the study. **In all future communications, please use the study's reference number (22-0015)**.

On behalf of the committee, I wish you the best of luck with your study.

Sincerely,

[redacted]

[redacted]
Chair, Research Review Board
Department of Evaluation and Assessment
[redacted]ndependent School District

[redacted]

APPENDIX B

CONCEPT DEVELOPMENT VOCABULARY EXAMPLES

Concept Development: Vocabulary

Analysis & Reasoning

-How are the words __ and __ the same?
-How are the words __ and __ different?
-Classify the word into category. A wasp is an insect.
-Why do we use ___? or How do you use ___?

Creating

-Can you think of synonyms or words that mean the same as ___?
-The child acts out the word.

Integration

-Connect the word with prior knowledge or known words.

Connections to Real World

-Ask how the word looks, sounds, smells, tastes and feels to the child.

(Pianta et al, 2008)

APPENDIX C

CONCEPT DEVELOPMENT PHONOLOGICAL AWARENESS EXAMPLES

Concept Development: Sounds

Analysis & Reasoning
-What is the letter for the letter sound of /b/?
-Which is your favorite letter sound? Why?
-How are the letter sounds of __ and __ different?

Creating
-What letters have the letter sound in the letter name?
-How did you make the letter sound?

Integration
-The sound letter that you made is like one of our letter sounds from the morning message. Where else have we looked at the letter sound?

Connections to Real World
-Mia has the letter sound /m/ in her name. Do you have a letter sound /m/ in your name?

Concept Development: Syllabication

Analysis & Reasoning
-How many parts or syllables are in the words ___?
-Why did you clap 2 times for the word ___?
-What would happen if I have if I take away rain from rainbow?
-Which word has more syllables crocodile or bug?

Creating
-Can you think of animal words that have 2 syllables?
-Show me the parts or syllables for the word _____.

Integration
-The word __ from our morning message is also in this story.
-Can you clap the syllable or parts of the word ___?

Connections to Real World
-Clap the parts or syllables of your name/ last name. .

Concept Development: Rhyming

Analysis & Reasoning
-How are the words __ and __ the same?
-How are the words __ and __ different?
-If I changed the ending sounds from /at/ to /ed/, what will be the new word?
-Why do the words rhyme?

Creating
-Can you think of words that rhyme with ___?
-Tell me a word that rhymes with your name.

Integration
-Our story has rhyming words of __ and __. Can you think of other stories that we have read that also have rhyming words?

Connections to Real World
-Which is your favorite rhyming words? Do you have a book at home that has rhyming words?

Concept Development: Alliteration

Analysis & Reasoning
-How are the words __ and __ the same?
-How are the words __ and __ different?
-If I changed the beginning sound from /b/ to /c/, what will be the new word?
-Why is it important to know the sounds of the letters?

Creating
-Can you think of words that begin with the same sound as ___?
-Tell me a word that word that begins with the same beginning sound as __.

Integration
-Our morning message had words that began with the sounds of /m /. What words from our story title begins with the sound of /m / from our morning message?

Connections to Real World
-Can you think of a word that begins with the same sound as your name?

(Pianta et al, 2008)

APPENDIX D

QUALITY OF FEEDBACK VOCABULARY EXAMPLES

Quality of Feedback: Vocabulary

Scaffolding
-Hints or Assistance
Feedback Loops
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.
Prompting Thought Process
-How do you know that the word ___ feels smooth?
Provide Information
-Define the word using language that the child understands
Encourage and Affirm
-Yes, the words ___ and ___ mean he same thing. You did a great job of finding a synonym for the word ___.

(Pianta et al, 2008)

APPENDIX E

QUALITY OF FEEDBACK PHONOLOGICAL AWARENESS EXAMPLES

Quality of Feedback: Syllabication

Scaffolding
-Hints or Assistance
-You can place your hand under your chin to feel the syllable sounds tap your hand.
Feedback Loops
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.
Prompting Thought Process
-How do you know? or Why do you say that?
Provide Information
- The word ___ has 2 syllables or two parts.
Encourage and Affirm
-You know the syllables of parts of the word ___. That is marvelous!

Quality of Feedback: Sounds

Scaffolding
-Hints or Assistance
-The letter sound is made by pressing lips together.
Feedback Loops
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.
Prompting Thought Process
-How do you know? or Why do you say that?
Provide Information
-The letter name of f has the sound of /f/ at the end the the letter name.
Encourage and Affirm
-Yes, the letter b makes the sound of /b/. You know how to make the sound of b. That is wonderful!

Quality of Feedback: Rhyming

Scaffolding
-Hints or Assistance
-Emphasize the ending sounds of the two words.
Feedback Loops
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.
Prompting Thought Process
-How do you know? or Why do you say that?
Provide Information
-Rhyming words are words that end with the same sounds. The words bed and red both end with the /ed/ sound.
Encourage and Affirm
-It is awesome that you know that ___ and ___ rhyme.

Quality of Feedback: Alliteration

Scaffolding
-Hints or Assistance
-Emphasize the beginning sounds of the two words.
Feedback Loops
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.
Prompting Thought Process
-How do you know? or Why do you say that?
Provide Information
- ___ and ____ are word that begin with the same sound of /_/.
Encourage and Affirm
-It is amazing that you know that ___ and ___ begin with the same sound.

(Pianta et al, 2008)

APPENDIX F

LANGUAGE MODELING VOCABULARY EXAMPLES

Language Modeling: Vocabulary

Back and Forth Conversations

-Encourage children to talk to one another

-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.

Open-Ended Questions

-Use the Analysis and Reasoning questions to employ open-ended questions

Repetition and Extension

-Repeat what the child says using a more complex sentence or description.

Self and Parallel Talk

-Joey is acting out the word leap by jumping forward.

Advance Language

-Define the word.

-Provide synonym, taxonomy, function, and sensorial description of the word.

-Use the word in context.

(Pianta et al, 2008)

APPENDIX G

LANGUAGE MODELING PHONOLOGICAL AWARENESS EXAMPLES

Language Modeling: Sounds

Back and Forth Conversations
-Encourage children to talk to one another
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.

Open-Ended Questions
-Use the Analysis and Reasoning questions to employ open-ended questions

Repetition and Extension
-Repeat what the child says using a more complex sentence or description.

Self and Parallel Talk
-Joey is making the sound of /b/ by pressing his lips together.

Advance Language
-Define letter sounds.
-Provide synonym, taxonomy, function, and sensorial description. .
-Use the word in context.

Language Modeling: Syllabication

Back and Forth Conversations
-Encourage children to talk to one another
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.

Open-Ended Questions
-Use the Analysis and Reasoning questions to employ open-ended questions

Repetition and Extension
-Repeat what the child says using a more complex sentence or description.

Self and Parallel Talk
-Joey is clapping the syllables or parts of the word ____.

Advance Language
-Define syllables
-Provide synonym, taxonomy, function, and sensorial description
-Use the word syllables in context.

Language Modeling: Rhyming

Back and Forth Conversations
-Encourage children to talk to one another
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.

Open-Ended Questions
-Use the Analysis and Reasoning questions to employ open-ended questions

Repetition and Extension
-Repeat what the child says using a more complex sentence or description.

Self and Parallel Talk
-I am saying the ending sounds of /ed/ and /ed/.

Advance Language
-Define rhyming
-Provide synonym, taxonomy, function, and sensorial description
-Use the word rhyming in context.

Language Modeling: Alliteration

Back and Forth Conversations
-Encourage children to talk to one another
-Use the Analysis and Reasoning questions to engage in back and forth interactions with the child.

Open-Ended Questions
-Use the Analysis and Reasoning questions to employ open-ended questions

Repetition and Extension
-Repeat what the child says using a more complex sentence or description.

Self and Parallel Talk
-I am saying the beginning sounds of /m and /m/.

Advance Language
-Define alliteration.
-Provide synonym, taxonomy, function, and sensorial description
-Use the word alliteration in context.